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ABSTRACT

The primary purpose of the research presented in this paper is to develop a more complete model of educational attainment. Age at first birth is examined by multiple regression, along with other independent variables that have been found to affect educational attainment, including age at marriage. The second purpose of this paper is to address the question of causality between early childbearing and termination of education. Social, demographic, and motivational factors that affect school attainment are examined. Some of these factors include family background, region of residence, inequalities in opportunities and final between blacks and whites, aptitude or ability, and encouragement from parents between black and whites, aptitude or ability, and encouragement from parents teachers and/or peers. Data used in this report are from the Michigan Panel Study of Income Dynamics and the National Longitudinal Survey of Young Women. Findings presented indicate that an early birth affects the amount of schooling a young woman is able to complete, particularly among whites, even when family background and motivation are controlled for. Early marriage is also cited as having a strong negative effect on schooling. The general conclusion proposed in this report is that an early first birth results in a life-long loss of schooling. (Author/EB)

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THE CONSEQUENCES OF AGE AT FIRST CHILDBIRTH: EDUCATIONAL ATTAINMENT

by

Kristin A. Moore, Linda J. Waite, Steven B. Caldwell, and Sandra L. Hofferth

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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THE CONSEQUENCES OF AGE AT FIRST CHILDBIRTH:

EDUCATIONAL ATTAINMENT

The importance of schooling to an individual's later life outcomes has been documented for a number of areas, including income and occupation (Janowitz, 1976; Trussell, 1976; Lapham, 1973; David et al., 1961; Coombs et al., 1970; Coombs and Freedman, 1970; McClendon, 1976; Duncan et al., 1972), family size (Terhune, 1974; Bonham and Placek, 1975; Trussell, 1976; Menken, 1975; Rindfuss and Sweet, 1975; Furstenberg, 1976; Bumpass, 1969; Busfield, 1972; Gregory and Thomas, 1976; Janowitz, 1976; Kohen and Barker, 1976), sex role orientation (Mason, 1974), unemployment (Furstenberg, 1976), and even divorce (Furstenberg, 1976; Bacon, 1974; Weed, 1974; Davis and Bumpass, 1976). Therefore, it seems critical to develop a model of educational attainment that accurately portrays the factors that affect schooling.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Given the large array of variables that researchers have included in models of status attainment, it is surprising that the impact of early childbearing on female educational attainment has not been evaluated. The several studies that have examined age at first birth have been oriented toward the study of pregnant adolescents and such studies have, unfortunately, typically been characterized by restricted and/or specialized samples (for example, Furstenberg, 1976; Presser, 1976; Klerman and Jekel, 1973), lack of controls for initial differences between adolescents who become mothers and those who do not (see Pauker, 1969, for numerous examples), and a focus on relatively short-run consequences (Pozsonyi,1973; Sauber and Rubinstein, 1965; Furstenberg, 1976).

Despite their shortcomings the studies that have been done have rather consistently documented a strong association between age at first birth and years of schooling completed by young women (see Table 1). Bacon (1974) and Trussell (1976) both rely upon the 1967 Survey of Economic Opportunity, a national sample of ever-married mothers. Although women who never marry and who never become mothers are therefore excluded, the data do indicate a clear association between age at first birth and educational attainment for both blacks and whites. Unfortunately, no controls except for race are included.

Furstenberg (1976b) found in his six-year study of young predominately black, adolescent mothers, that between 50 and 67 percent of the females who left school cited pregnancy and/or marriage as the principle reason for dropping out. He also reports that only half of the adolescent mothers in his sample completed high school compared to nearly 90 percent of their peers who avoided a premarital pregnancy.

Presser (1976) in a recent study of New York City mothers of first borns, found that 8 in 10 teenagers had unplanned first births and that, not

TABLE 1: Summary of Associations Between Educational Attainment & Age at First Birth Reported in Previous Research

Research — Bacon (1974) (Same data reported by Trussell, 1976)

Description of Sample — 1967 Survey of Economic Opportunity (SEO) (Sample: ever-married mothers)

Age at First Birth - Educational Attainment — % by Years of School Completed by Age 59 Years

AFB	8	9-11	12	13	Total
ALL RACES					
All ages	27.4	20.8	36.1	15.6	100.0
13-15	57.8	30.0	10.6	1.6	100.0
16-17	39.7	40.5	17.5	2.2	100.0
18-19	29.0	26.2	38.7	6.1	100.0
20-21	25.6	18.6	41.5	14.2	100.0
22	23.0	14.5	38.4	24.1	100.0
ALL WHITES					
All ages	26.1	20.2	37.6	16.1	100.0
13-15	60.4	28.5	9.3	1.7	100.0
16-17	38.7	41.6	17.8	1.9	100.0
18-19	28.1	25.7	40.1	6.0	100.0
20-21	24.5	18.6	42.6	14.3	100.0
22	22.2	14.3	39.3	24.3	100.0
ALL BLACKS					
All ages	40.5	27.2	22.5	9.9	100.0
13-15	54.0	32.0	12.9	1.2	100.0
16-17	42.9	36.9	17.3	3.0	100.0
18-19	35.3	31.2	26.9	6.8	100.0
20-21	38.9	19.2	29.7	12.4	100.0
22	37.2	18.3	23.0	21.4	100.0

Research — Furstenberg (1976)

Description of Sample — 6 Year study of 400 Baltimore women 18 years at first pregnancy, compared with peer group. (Sample: virtually all Black.) (1966 to 1972)

Education in 1972	Adolescent Mothers	Classmates PMP*	Classmates Not PMP	Total
Not high school graduates	51%	18%	11%	100%
Never returned	23	0	0	
Returned, no longer in school	20	14	9	
Returned, still in school	8	4	2	
High school graduates	49%	82%	89%	100%
Never returned	7	0	0	
Returned, no longer in school	33	65	62	
Returned, still in school	9	17	27	

* Pre-maritally Pregnant. (Adolescent mothers both wed and unwed.)

Research — Presser (1976)

Description of Sample — New York City mothers of first borns: 408 women who had a 1st child in July 1970, 1971, or 1972. Interviewed 1973, 1974 and 1976.

Age at First Birth	% Not Graduated from High School at the Time of First Birth
15 - 17	85%
18 & 19	54
20	10

Age at First Birth	% - Pregnancy Cited as Reason for Dropping Out of School (at Time of First Interview)
15 & 16	75%
17	38
18	28
19	19

surprisingly, as the age of the teenager decreased, the likelihood that her pregnancy interrupted her education increased. In this study, 75 percent of the 15 and 16 year olds dropped out because of pregnancy; while 38 percent of the 17 year olds, 28 percent of the 18 year olds, and 19 percent of the 19 year olds gave this reason.

Researchers studying adolescent pregnancy need to develop more complex statistical models of the association between age at first birth and education so that important controls for the social, demographic, and motivational factors that affect school attainment can be included. On the other hand, the multivariate model-builders studying status attainment need to incorporate age at first birth into their equations since such a measure should have a powerful impact on educational attainment, if those who study teenage pregnancy are correct.

The principal purpose of the research reported in this paper is to develop a more complete model of educational attainment, including age at first birth as an independent variable in a multiple regression equation along with other independent variables that have been found to affect educational attainment, including age at marriage, and to test this model among several population sub-groups.

The second purpose of this paper is to address the question of causality between early childbearing and termination of education. Cutright (1973), for example, does not feel that pregnancy causes girls to quit school, and it is undoubtedly true that some girls quit school and only later becomes pregnant. To explore this issue, two-stage least squares and transition probability models will be developed.

Previous Research on Educational Attainment

Although until quite recently most research on the status attainment process has focused exclusively on males, the factors which determine the amount of

formal schooling obtained appear to be quite similar for both sexes (Treiman and Terrell, 1975; Sewell and Shah, 1967; Bayer, 1969). It appears, therefore, that we can begin our model by building on the complex and well-tested models of educational attainment of males. Because the theoretical arguments for including various background variables in such models have been presented in much detail elsewhere,[1] we will only review briefly the previous findings that are relevant for our research. (Since we deal only with females here, comparisons between males and females in the mechanisms by which schooling is achieved will not be discussed.)

Characteristics of an individual's family of origin have consistently been found to have a sizeable impact on the attainment of the children themselves (Blau and Duncan, 1967; Duncan, Featherman and Duncan, 1972; Sewell and Shah, 1967, 1968). Frequently used measures of family background include mother's and father's education, father's occupation, and family income. Each of these factors has been found to have a direct effect on years of schooling completed; and, Hauser (1972) reports, these effects are independent and of approximately equal magnitude. Several studies have also assessed the effect on educational attainment of the size of the family of orientation (Blau and Duncan, 1967), whether it was intact (Duncan, Featherman and Duncan, 1972), and region of residence (Sewell, Haller and Ohlendorf, 1970). These findings indicate that those from small, intact families living outside the South are relatively advantaged in the competition for education.

Substantial inequalities in opportunity and final attainment between blacks and whites have been documented (Jencks, et al., 1972; Duncan, 1967,

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1. The interested reader should see especially Blau and Duncan (1976), Duncan, Featherman and Duncan (1972), Sewell and Shah (1967, 1968), Alexander and Eckland (1975).

1968); however, when blacks and whites of similar ability and parental status are compared, it has been found that blacks have a higher educational attainment (Portes and Wilson, 1976). This race effect has been explained in terms of intervening performance, attitudinal and interpersonal factors, that is, "the superior school performance of blacks, their higher self-esteem and aspirations, and the more favorable influence of their significant others, as compared to whites of similar background and ability..." (Portes and Wilson, 1976: 428). For whites, it is parental status, measured ability and grades that are the more significant factors in the educational attainment process. Overall, the effects of virtually all determinants of educational attainment have been found to depend on race (Portes and Wilson, 1976: 428). In addition, aptitude or ability, encouragement from parents, teachers and peers have all been found to be important predictors of ultimate educational attainment (Duncan, 1968; Jencks, et al., 1972; Hauser, 1972). Measures of these factors are included, to the extent possible, in our model of women's formal schooling.

Hypotheses

Building on the work of both attainment researchers and analysts studying adolescent pregnancy, as well as our own previous work (Moore and Caldwell, 1976), we have formulated the following hypotheses:

1) The younger the woman when she bears her first child, the fewer years of schooling she will complete. This occurs because the roles of student and mother are, in many senses, competing. Young women who became pregnant while in junior high or high school were, until very recently, typically forced by school policy to leave school. Arrangements for the continuation of the education of teenage mothers are still inadequate. Even when the young mother is not kept from attending school, the difficulty of arranging and paying for infant care while she attends classes, the burden of household tasks such as laundry and feeding, the problem of financial support, plus pressure from parents, peers, boyfriend or spouse to spend as much time as possible with the child all decrease the likelihood that an adolescent who has recently borne a child will continue in school. The impact of early childbearing is, we hypothesize, such a powerful inhibitor of educational attainment, that even after appropriate controls for family background and motivation, the

association between age at first birth and lowered educational attainment will remain.

2) Second, we expect that the educational disadvantage suffered by young mothers will not decrease as they become older; those who bear children in their early teens will not be able to close the attainment gap that separates them from young women who delay childbearing. Indeed, the gap may widen with age as childless women continue to progress in school.

3) We expect that other determinants of years of schooling completed will be conditioned by age at first birth. The very process of educational attainment is expected to differ. That is, the process by which age at entry into parenthood influences a school career is not simple and straightforward; there are certain groups for whom adolescent childbearing has a stronger or weaker effect on formal schooling, and the process by which attainment is determined is different for young mothers than for those who avoid early parenthood. Essentially we are hypothesizing that the occurrence or absence of an early first birth creates groups of women for whom the process of educational attainment is in many ways different. Specifically, those who bear children during their early teens should be less able than those who delay entrance into motherhood to convert an advantageous family background, motivation, help from others or ability into education for themselves.

4) We hypothesize that the effect of adolescent childbearing differs for blacks and whites. Since parenthood during the teen-age years is so much more common among blacks, it may carry less social stigma than among whites and informal social mechanisms for coping with this event may be more highly evolved for the former than for the latter group. Thus, net of other factors, we hypothesize that an early birth should have fewer negative consequences for young black than for young white women when other factors are controlled.

5) We hypothesize that early childbearing has a causal impact on the number of years of school a woman completes. But, we also expect that the causal process is highly complicated, and that the amount of schooling a woman completes also affects the at which she bears her first child. Rather than positing only one direction of causality, simultaneous estimation techniques are necessary to capture the complexity of the causal process. We expect that age at first birth and schooling will each affect the other, that causality operates in both directions. One might expect, for example that a first birth to a teenager frequently precipitates the termination of schooling. It is also likely, though, that the longer a woman attends school, the longer she puts off marriage and childbearing. In this sense, educational attainment can be said to delay the first birth. However, although we predict a simultaneous relationship between education and the age at which a woman bears her first child overall, we expect the effect of age at first birth to predominate among those who are particularly young when they have their first child. Among those who bear their first child after high school, we expect the effect of schooling on age at first birth to dominate. Exploration of these issues requires specification of simultaneous

causality among separate sub-samples--those having a first birth when 18 or younger and those delaying until they are at least 19. A second analysis strategy will explore the impact of a birth on school drop-out. We expect that the transition probability for quitting school is considerably higher among those young women experiencing a birth than for the sample of young women as a whole.

DATA

Analyses were conducted on two national longitudinal data sets, the National Longitudinal Survey of Young Women (NLS) and the Panel Study of Income Dynamics (PSID). Both surveys were initially fielded in 1968 and in each case respondents were interviewed annually. Analyses reported here include interviews through the year 1972 for the NLS and up through 1976 for the PSID. While similar in their focus on economic and employment issues, the two surveys sample quite different populations, and consequently complement one another. Each data set will be described in turn.

The National Longitudinal Survey of Young Women

The National Longitudinal Survey of Young Women (NLS) is funded by the U.S. Department of Labor to study the labor market experiences of contemporary young women. It is designed by the Center for Human Resource Research of Ohio State University and fielded by the U.S. Census Bureau. The initial wave in 1968 sampled over 5,000 young women between the ages of 14 and 24. Attempts to reinterview these young women were made annually from 1969 through 1975. Sample retention has been very good. By 1972, the last year considered here, 4625 respondents--90 percent of the original sample--remained in the survey. Since the initial response rate was 94 percent, data on nearly 85 percent of the sample that was initially drawn are available for the current analysis. While these data are among the best available, sample attrition may have reduced the original representativeness, and some caution in generalizing to the entire population is necessary.

In order to produce statistically reliable estimates for black women, households in enumeration districts known to be predominantly black were selected at a rate three times greater than the rate for white enumeration districts.

In 1968, 3638 white women and 1459 black women were interviewed. (Sixty-two young women of other races were interviewed but have been consistently excluded from these analyses because of their diversity.) A sample weight was assigned to each individual case to correct for the fact that different groups of the population had different probabilities of selection. The weights were computed so that the sum of the weights would equal the sample size of 5159.

The NLS data are especially well-suited for a study of the consequences of early childbearing because they follow young women through the teenage and young adult years when family-building typically takes place. For a large proportion of the sample, data on marriage and childbearing are not retrospective but are gathered as the events occur. Because extensive information on the educational and work experience as well as the social and economic background of respondents was obtained, detailed comparisons can be made between women who became mothers while teenagers and other young women who postponed their childbearing. Such extensive data are not frequently available for so large or contemporary a sample.

The changes occurring in respondents' lives are illustrated in Table 2. The number never-married, the number currently enrolled in school drops drastically by 1972, and the number who have never been employed all shrink dramatically as time goes by. Large numbers of respondents initiated childbearing during the years of the survey. While 23 percent had had a birth by 1968, an additional 24 percent had a birth during the survey. Of the respondents having at least one child by 1972, 751 or 31 percent of the respondents bore their first child by age 18.

TABLE 2

CHANGES IN LIFE STATUS AMONG RESPONDENTS IN THE NATIONAL LONGITUDINAL SURVEY BETWEEN 1968 and 1972 (UNWEIGHTED N's)

Marital Status	1968	1972
Married, spouse present	1,473	2,527
Married, spouse absent	114	68
Widowed	3	13
Divorced	56	137
Separated	73	194
Never married	3,440	1,686
N/A	0	534
School Enrollment Status		
Currently enrolled	2,381	785
Not Currently enrolled	2,628	3,840
N/A	0	534
Labor Force Status		
Employed	2,051	2,403
Unemployed	409	344
Out of labor force	1,453	1,744
Never worked	1,246	134
N/A	0	534
Childbearing Status		
Respondent has had at least one child	1,179	2,399
Respondent has had at least one child by age 18	480	751

Two distinct conceptual approaches to the analysis have been utilized. In the first, the "status attainment approach," the respondent's social and economic attainment by a certain age is evaluated as a function of her age at first birth. Initially, this has been done in table format. For example, mean years of school completed by age 18, by age 21, and by age 24 are arrayed by the respondent's age at first birth, with controls for respondent's race and socioeconomic origin. The ages 18, 21, and 24 were chosen to permit comparison of the progress of the young women at three-year intervals.

Since many of the variables needed for this analysis were measured only for the survey years, 1968 to 1972, and not for earlier periods, only young women who turned 18, 21, or 24 during those years were included in the analysis for each of those ages. Thus, for example, the analyses of attainment by 18 include only those respondents who were 14 to 18 in 1968--those who were or who became 18 during the survey period. The dependent variable in each analysis was measured for each respondent in the year that she turned 18, 21, or 24. The reader should keep in mind that the young women who are included in the analysis of attainment by age 18 are not the same ones who are included in the analysis of attainment by age 24, as the table below demonstrates.

	Attainment at Age 18 Analysis	Attainment at Age 21 Analysis	Attainment at Age 24 Analysis
Respondent's Age in 1968	14-18	17-21	20-24

Some respondents may appear in two of the analyses, but none appear in all three and the oldest and youngest are included in only one of the analyses. So some care must be used in comparing the results of the three analyses.

While the first strategy focuses on achieved status at ages 18, 21, and 24, the second strategy examines the year by year processes by which the ultimate achieved statuses are attained. For example, while the status attainment strategy focuses on the impact of childbearing age on grades of formal schooling completed, the transition probability strategy examines childbearing effects on separate school continuation decisions. The two strategies complement one another. While the attainment strategy is a far more familiar research methodology, the mobility approach provides unique insights. It focuses on the population at risk of an event, for example, the population attending school who are at risk of dropping out or the population of women who are employed who might become unemployed. Within that population, the impact of an event, such as a birth, on a change such as dropping out, can be estimated.

Because the accumulation of schooling takes a number of years, the determinants of school continuation decisions may not be the same at all levels of schooling. In short, to examine separately the sequence of annual transitions in schooling, marital status, working and welfare is to further unravel the impact of first birth on women's lives.

The Michigan Panel Study of Income Dynamics

The Panel Study of Income Dynamics was inaugurated in 1968 to provide information on short run changes in the economic status of families and individuals. To this end, approximately 5,000 families have been interviewed annually through 1978. Data obtained through 1976 are included in the current analyses.

The original sample consisted of a cross-section sample of dwelling units within the continental United States plus a subsample of families interviewed in 1967 by the U.S. Bureau of the Census. Since 1968, the sample has consisted of all panel members living in families that were interviewed the previous year plus newly-formed families that include any adult panel member who had moved out of the sample household since 1968. The addition of newly formed families has resulted in an increased sample size despite sample attrition.

Panel losses were considerable (24 percent) in the first year but have been relatively minor in recent years. However, the cumulative response rate including initial and subsequent losses, is only 55 percent. The data were weighted in 1972 to adjust both for different sample fractions and for different rates of nonresponse. Since that time, attrition has not been sufficiently great to warrant further adjustment, and the authors present evidence that estimates made from the PSID correspond closely with estimates obtained from the Current Population Reports (Survey Research Center, 1976, pp. 499-510).

The PSID was explicitly initiated to provide the best possible measures of respondents' family incomes, individual wages, and employment history. The income measures are generally considered to be superior to estimates from the Current Population Survey (Minarik, 1975), and tabular comparisons of both data sets show a high degree of congruence on the weighted distributions of most standard demographic variables (Sawhill et al., 1975). Despite the reassurance that this provides, it seems extremely important to use caution in generalizing from results to the entire United States population.

For the years 1968 to 1975, all information is related to the head of the household. Consequently, little information is available on married women, since they are not defined as heads. Fortunately, in 1976, wives were also interviewed, and detailed information on wives' labor force participation, family background, and earnings was obtained. In addition, wives supplied information on their age at marriage and age at first childbirth, data that cannot be reliably obtained from some of the interviews held with the husband, who is defined as the head of the household.

Although initial plans called for analyses on all women who turned 24, 30, 36, and 42 during the course of the survey, it soon became clear that a far richer and more complete analysis could be done if emphasis were placed on the sub-set of wives and female heads who were interviewed in 1976. Moreover, the number of women available for analysis was not greatly diminished. Of 2630 wives and female heads aged 16 to 42 in 1968, 156 (6 percent) were not interviewed in 1976. For the 2474 wives and female heads in our sample who were interviewed, there is a wealth of information. The slight loss in sample size seems far outweighed by the additional information available on these women and their experiences.

MEASUREMENT OF AGE AT FIRST BIRTH

Neither the NLS nor the PSID contain a childbearing history for women. Consequently it was necessary to construct such a record for all respondents. The procedure by which this was done for each data set will be described.

The National Longitudinal Survey of Young Women. To develop a measure of the young woman's age at first birth (AFB), the household record in 1968 was searched for any sons or daughters of the respondent. The age of the oldest of the respondent's children was subtracted from the respondent's age in 1968 to yield age at first birth. First births which occurred in subsequent survey years were identified by searching the household records of childless respondents. When a first birth was identified, the respondent's age at the last interview was assigned as her Age at First Birth. Since exact birth dates are not known for either the respondent or her children and age is coded only in full years for respondents and children over three, the measure of age at first birth contains some error. Where some uncertainty existed our decision rule erred by assigning the older age at first birth.

The measure of age at first birth used here does not include children who were given up for adoption shortly after birth, who were stillborn, who died in early childhood, or those who were sent to live outside the respondent's household. Own children of the respondent cannot be distinguished from adopted children. We are, then, in effect, measuring the impact of the age at which a young woman takes on the duties and responsibilities of motherhood, the age at which she becomes a parent in a social sense. The variable used here should be a fairly unbiased measure of sociological, if not of biological, motherhood.

Panel Study of Income Dynamics. The measure of age at first birth (AFB) was determined differently for wives and for female heads. For the 1701 women in

the sample who completed the survey for wives in 1976, the age of her oldest child as reported by the wife was subtracted from the wife's age. No similar information was available for female household heads; consequently the measure of age at first birth for the 773 women who were household heads in 1976 was based on the household record. If a first birth occurred during the survey years, the woman's age in the year of the birth was assigned. Otherwise, the household record for 1968 was searched for the age of the oldest child and this age was subtracted from the woman's own age. Since women in the sample in 1968 could have been as old as 42 in that year, it is possible that some of their children would have grown up and left home. This, of course, would result in an incorrect assignment of age at first birth. This would only be a problem for women approximately 32 to 42 years of age in 1968-- 38 percent of the sample of female household heads or 12 percent of the total sample of women. However, the children most likely to be missed are those born to the youngest mothers, since they are most likely to have grown up and left home before she turned 40. Because of this problem, analyses are done not just for all women but separately for women under age 35 and age 35 or older: analyses among younger women should not be affected by this problem. Analyses among wives are also unaffected.

Comparison of Age at First Birth Distributions with Current Population Reports

Table 3 presents the weighted proportions of women in the NLS and PSID samples in several age-at-first-birth categories. These distributions can be compared with distributions calculated from data from the 1971 and 1975 Current Population Reports for first births that occurred after the year 1960. The distributions are strikingly similar, although both NLS and the PSID samples have a higher proportion of births among women at older ages. The highest proportion occurs among the total PSID sample, which, as noted above, is

probably elevated by the loss of some early births among older family heads. The young women in the NLS and in the young women PSID sub-sample have few first births that occurred as early as 1960, and since the younger the sample,

Table 3: The Distribution of Women by their Age at First Birth, 1971 and 1975 Current Population Survey (First Births Occurring After 1960), National Longitudinal Survey and Panel Study of Income Dynamics (Weighted)

Age at First Birth	1971 CPS	1975 CPS	NLS at age 24	PSID Total	PSID 35
17	.128	.129	.113	.112	.113
18	.095	.092	.095	.062	.071
19-20	.259	.248	.186	.214	.212
21+	.518	.530	.607	.633	.605

the more likely the women would have participated in the trend toward delayed childbirth (Bureau of the Census, 1978), it seems likely that some of the difference represents true societal changes over time. While the overall correspondence of the NLS and PSID data with Census Bureau data is most encouraging, it should be kept in mind that some inaccuracy due to coding and missing information was unavoidable. As always, our results should be considered within the context of the findings of other researchers, as well as one's theoretical expectations.

RESULTS

The Simple Association Between Age at First Birth and Educational Attainment

Our initial hypothesis posits that the younger the woman when she bears her first child, the fewer years of schooling she will complete. This relationship is clearly evident in Table 4, which presents mean years of schooling completed by the NLS women at ages 18, 21, and 24, by age at first birth, race, and parental socioeconomic status. A similar association is apparent in Table 5, which presents mean years completed by PSID women in 1976. The association between age at first birth and years of education is positive and monotonic almost without exception in every sub-group at every age.

A comparison of attainment at ages, 18, 21, and 24 (Table 4) suggests that there is virtually no increase in schooling among young mothers as they move into their twenties. Those having their first child at a somewhat later age, for example, 18 rather than age 15 or under, do attain notably more schooling; however, none of the groups of women having children by age 18 show increases in their mean level of schooling from age 18 to 21 to 24. On the other hand, those young women who postpone childbearing past ages 18, 21, and 24, respectively, show impressive increases in mean levels of education.

Table 5 suggests the obvious explanation for the lack of progress in educational attainment among the NLS young women with children. Regardless of their age at first birth, mothers are considerably less likely to be enrolled in school than are their childless peers, though by age 24 very few women of any childbearing status are enrolled.

Examination of the PSID women, all of whom were at least 22 at the time of the 1976 interview does show some increases in education (see Table 6). Among the younger PSID women (those aged 22 to 34 in 1976) who became mothers at age 15 or less, the mean number of years completed is 10.4, compared to 8.9 among

Table 4: Mean Educational Attainment at Age 18,21, and 24 by Respondent's Age at Her First Birth, Race, and Parental Socioeconomic Background (National Longitudinal Survey)

Age of Respondent at First Birth	Educational Attainment at age 18		Educational Attainment at age 21		Educational Attainment at age 24	
ALL RACES						
≤15	9.4	(68)	9.4	(38)	8.9	(48)
16-17	10.4	(231)	10.4	(173)	10.5	(172)
18			11.5	(183)	11.3	(184)
19-20			11.8	(360)	11.9	(363)
21-23					12.7	(400)
No children by 18,21,24	11.5	(2083)	12.9	(1434)	13.5	(784)
ALL WHITES						
≤15	9.4	(30)	9.4	(22)	8.9	(32)
16-17	10.4	(164)	10.4	(126)	10.5	(135)
18			11.6	(156)	11.3	(161)
19-20			11.8	(306)	11.9	(322)
21-23					12.8	(365)
No children by 18,21,24	11.5	(1889)	13.0	(1316)	13.7	(722)
Low SES						
≤15	8.6	(12)	8.7	(9)	8.8	(10)
16-17	9.4	(43)	9.4	(43)	10.0	(59)
18			10.9	(39)	10.8	(43)
19-20			11.1	(71)	11.1	(80)
21-23					11.4	(67)
No children by 18,21,24	11.0	(234)	11.4	(156)	11.5	(82)
Medium/High SES						
≤15	10.2	(16)	10.2	(9)	9.0	(14)
16-17	10.8	(102)	11.0	(70)	11.1	(62)
18			11.8	(99)	11.8	(97)
19-20			12.1	(200)	12.2	(208)
21-23					13.2	(264)
No children by 18,21,24	11.7	(1539)	13.3	(1072)	14.1	(581)
ALL BLACKS						
≤15	9.4	(38)	9.4	(15)	9.0	(16)
16-17	10.6	(67)	10.4	(47)	10.1	(37)
18			11.1	(27)	10.9	(24)
19-20			11.8	(55)	12.0	(42)
21-23					12.1	(35)
No children by 18,21,24	11.0	(193)	12.2	(118)	12.0	(62)
Low SES						
≤15	9.2	(19)	8.8	(7)	8.5	(8)
16-17	10.6	(30)	10.3	(21)	10.1	(22)
18			10.8	(14)	10.3	(13)
19-20			11.5	(26)	11.5	(20)
21-23					11.3	(14)
No children by 18,21,24	10.8	(85)	11.6	(49)	11.6	(30)
Medium/High SES						
≤15	10.4	(8)		(3)		(3)
16-17	10.8	(17)	11.0	(12)	11.8	(6)
18			11.6	(8)	11.7	(8)
19-20			12.2	(21)	12.7	(14)
21-23					12.9	(14)
No children by 18,21,24	11.4	(71)	13.1	(50)	13.3	(23)

: n < 5
-: n = 0

SES measured as the mean of four variables—occupation of head of household, mother's education, father's education, and presence of reading materials in the home of origin. Variables were standardized to have a mean of 10 and a standard deviation of 3.
N's in parentheses.

Table 5: Percent Enrolled in School at Ages 18, 21 and 24 by Age at First Birth, Race and Parental Socioeconomic Background (National Longitudinal Survey)

Age of Respondent at First Birth	Percent Enrolled in School... at age 18	at age 21	at age 24
ALL RACES			
≤15	10.0% (69)	3.0% (39)	0.0% (49)
16-17	11.0 (231)	1.0 (186)	0.8 (182)
18		2.0 (184)	0.8 (194)
19-20		2.0 (362)	0.6 (381)
21-23			1.0 (405)
No children by 18,21,24	49.0 (2190)	26.0 (1569)	4.0 (879)
ALL WHITES			
≤15	4.0% (30)	5.0% (22)	0.0% (32)
16-17	6.0 (164)	0.0 (133)	0.8 (139)
18		2.0 (156)	0.7 (169)
19-20		2.0 (306)	0.4 (336)
21-23			1.0 (366)
No children by 18,21,24	49.0 (1961)	26.0 (1424)	4.0 (800)
Low SES			
≤15	0.0% (12)	0.0% (9)	0.0% (10)
16-17	0.0 (43)	0.0 (45)	0.0 (60)
18		0.0 (39)	0.0 (44)
19-20		2.0 (71)	0.0 (84)
21-23			0.0 (68)
No children by 18,21,24	30.0 (244)	5.0 (170)	1.0 (94)
Medium/High SES			
≤15	8.0% (16)	13.0% (9)	0.0% (14)
16-17	8.0 (102)	0.0 (75)	2.0 (62)
18		4.0 (99)	1.0 (102)
19-20		2.0 (200)	1.0 (214)
21-23			2.0 (264)
No children by 18,21,24	53.0 (1587)	30.0 (1153)	4.0 (641)
ALL BLACKS			
≤15	16.0% (39)	0.0% (17)	0.0% (17)
16-17	22.0 (67)	4.0 (52)	1.0 (42)
18		2.0 (27)	2.0 (24)
19-20		4.0 (55)	2.0 (44)
21-23			0.0 (36)
No children by 18,21,24	50.0 (205)	20.0 (129)	4.0 (71)
Low SES			
≤15	7.0% (19)	0.0% (8)	0.0% (8)
16-17	23.0 (30)	8.0 (22)	2.0 (23)
18		0.0 (14)	0.0 (13)
19-20		1.0 (26)	2.0 (22)
21-23			0.0 (14)
No children by 18,21,24	51.0 (88)	13.0 (51)	0.0 (32)
Medium/High SES			
≤15	19.0% (8)	0.0% (3)	0.0% (3)
16-17	33.0 (17)	0.0 (12)	0.0 (7)
18		5.0 (8)	5.0 (8)
19-20		5.0 (21)	4.0 (14)
21-23			0.0 (14)
No children by 18,21,24	51.0 (77)	31.0 (56)	10.0 (27)

: n < 5
-: n = 0

SES measured as the mean of four variables—occupation of head of household, mother's education, father's education, and presence of reading materials in the home of origin. Variables were standardized to have a mean of 10 and a standard deviation of 3.
N's in parentheses.

TABLE 6: Mean Educational Attainment by Age at First Birth, Race, Parental Socioeconomic Background, Age of Woman in 1976 (Panel Study of Income Dynamics)

Age at First Birth	All Women 22+ in 1976	Women 22-34 in 1976	Women 35+ in 1976
Total Sample			
≤15	9.8 (37)	10.4 (18)	9.2 (19)
16-17	10.5 (266)	11.0 (102)	10.1 (164)
18	11.2 (168)	11.6 (77)	10.8 (91)
19-20	11.8 (528)	12.2 (229)	11.4 (299)
21-23	12.3 (584)	12.5 (220)	12.2 (363)
≥24	12.9 (654)	13.3 (153)	12.8 (501)
Childless in 1976	13.6 (464)	14.7 (276)	12.0 (187)
ALL WHITES			
≤15	9.8 (24)	10.3 (14)	9.1 (10)
16-17	10.4 (217)	11.0 (73)	10.0 (144)
18	11.1 (137)	11.6 (62)	10.8 (75)
19-20	11.8 (459)	12.2 (197)	11.4 (262)
21-23	12.4 (544)	12.6 (205)	12.3 (338)
≥24	13.2 (515)	13.4 (146)	13.1 (369)
Childless in 1976	14.7 (324)	14.9 (253)	13.8 (71)
Low PSES			
≤15	7.7 (7)	~ (4)	~ (3)
16-17	9.5 (45)	9.4 (21)	9.6 (24)
18	10.8 (40)	11.4 (15)	10.4 (25)
19-20	10.9 (118)	11.2 (35)	10.8 (82)
21-23	11.3 (141)	11.0 (26)	11.4 (115)
≥24	12.0 (124)	12.9 (19)	11.8 (105)
Childless in 1976	13.1 (34)	14.2 (14)	12.3 (20)
Medium/High PSES			
≤15	10.8 (15)	10.6 (10)	11.2 (6)
16-17	10.6 (166)	11.7 (49)	10.2 (116)
18	11.4 (91)	11.7 (45)	11.2 (46)
19-20	12.1 (326)	12.5 (158)	11.8 (167)
21-23	12.8 (392)	12.8 (178)	12.9 (214)
≥24	13.6 (380)	13.6 (124)	13.6 (256)
Childless in 1976	14.9 (288)	15.0 (237)	14.4 (51)
ALL BLACKS			
≤15	9.7 (13)	~ (4)	9.3 (9)
16-17	10.9 (49)	11.0 (29)	10.8 (20)
18	11.3 (32)	11.5 (15)	11.2 (17)
19-20	11.7 (69)	12.1 (32)	11.4 (37)
21-23	11.2 (40)	12.2 (15)	10.5 (25)
≥24	11.8 (139)	10.5 (7)	11.9 (132)
Childless in 1976	11.3 (140)	13.0 (23)	10.9 (117)
Low PSES			
≤15	9.6 (7)	~ (3)	~ (5)
16-17	10.4 (25)	10.8 (13)	10.1 (13)
18	11.4 (19)	11.5 (8)	11.2 (11)
19-20	11.1 (27)	11.8 (10)	10.6 (16)
21-23	11.3 (19)	11.9 (6)	11.0 (13)
≥24	10.4 (20)	~ (4)	10.7 (16)
Childless in 1976	11.3 (21)	12.1 (10)	10.6 (11)
Medium/High PSES			
≤15	~ (4)	~ (1)	~ (3)
16-17	11.5 (23)	11.2 (16)	12.1 (7)
18	11.7 (11)	12.1 (6)	~ (5)
19-20	12.3 (35)	12.4 (17)	12.3 (19)
21-23	11.4 (15)	12.7 (6)	10.5 (9)
≥24	12.1 (116)	~ (2)	12.1 (114)
Childless in 1976	11.2 (114)	13.8 (9)	11.0 (105)

~ : n ≤ 5

the NLS women. Among PSID women who became mothers at 16 or 17, the mean is 11.0, compared to 10.5 among the NLS mothers. While these are not particularly impressive gains, they do show that some women manage either to return to school or perhaps pass a high school equivalency examination.

Table 7 portrays this increase in a more striking fashion. By age 24, fewer than 10 percent of the youngest NLS mothers are high school graduates. However, among PSID women age 22 to 35, 40 percent of the blacks and 27 percent of the whites had managed to secure a high school diploma. This is an important gain, since evidence suggests that women who achieve at least a high school education are only half as likely to live in households receiving Aid to Families with Dependent Children (Moore, 1978). Nevertheless, in no instance do even half of the women who became mothers at 17 or younger manage to acquire 12 years of education.

Table 7: Percent of Women Completing Twelve or More Years of Schooling, by Age at First Birth and Race (National Longitudinal Survey and Panel Study of Income Dynamics)

Age at First Birth	NLS Women at Age 24		PSID Women 22-35	
	Black	White	Black	White
15	3% (33)	7% (28)	40% (25)	27% (11)
16	19 (42)	21 (42)	31 (42)	28 (18)
17	34 (47)	32 (79)	47 (62)	41 (39)
18	48 (48)	63 (136)	64 (53)	65 (48)
19	75 (47)	78 (151)	64 (47)	73 (71)
20	78 (40)	86 (121)	81 (42)	87 (70)
21	67 (30)	87 (110)	92 (26)	87 (46)
22	80 (25)	97 (93)	67 (18)	93 (60)
23	90 (20)	97 (97)	94 (16)	80 (39)
24	79 (120)	92 (594)	75 (24)	98 (102)
Childless in 1976 (PSID only)			86 (57)	99 (158)

THE ASSOCIATION BETWEEN AGE AT FIRST BIRTH AND EDUCATIONAL ATTAINMENT AFTER CONTROLLING FOR OTHER VARIABLES

The Impact of Age at First Birth

Tables 8 and 9 report the standardized and metric partial regression coefficients from a model of educational attainment that contains a fuller array of control variables.[1] Again, net of varied demographic, social, and motivational factors, early childbearing is associated with important educational decrements. For example, among NLS women at age 18, when most of the respondents are just finishing high school or beginning college, girls who bore a child at age 15 or younger suffer an educational decrement of 1½ years relative to those not having children by this age.[2] Those having a first birth at 16 or 17 experience a loss of two-thirds year. In addition, those delaying a first birth just to age 16 or 17 gain on the average .8 years relative to those having a birth at age 15 or younger.[3] At age 24, those who became mothers at age 15 or less have completed 2.8 fewer years compared to childless women, while those who became mothers at 16-17 have completed 1.4 fewer years.

On the whole, the magnitude of the impact of a first birth is slightly greater among PSID women, probably because fewer controls such as the home culture index could be included in the equation. However, the analyses of the two data sets are overall quite consistent and conclusive. In every case, the

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1. Variable definitions means, and standard deviations are presented in Appendix Tables 1 and 2.

2. The unstandardized coefficients for age-at-first-birth categories can be interpreted as the effect of having had a birth at that age on years of schooling completed compared with the effect among women who were childless at 18, 21, or 24 among NLS women or childless at 24 among PSID women.

3. Tests of statistical significance that compare the differences between pairs of individual coefficients relative to a pooled estimate of their standard error were conducted. These tests indicate that the differences in the decrements in educational attainments at 24 attributable to delaying a birth for one more year are statistically significant (p .05) for those delaying from 15 or less to 16 or 17, but not for those delaying from 18 to 19 or 20, or later.

Table 8: Partial Regression Coefficients (standardized and unstandardized) of Respondent's Educational Attainment at Ages 18, 21, and 24 on Respondent's Age at Her First Birth, Family Background, Social and Demographic Traits (National Longitudinal Survey)

Independent Variables	Educational Attainment at Age 18		Educational Attainment at Age 21		Educational Attainment at Age 24	
Age at First Birth	b	Beta	b	Beta	b	Beta
≤ 15	-1.465***	-.195***	-2.130***	-.146***	-2.824***	-.182***
16-17	-.669***	-.158***	-1.312***	-.187***	-1.446***	-.171***
18	-	-	-.566***	-.082***	-.927***	-.113***
19-20	-	-	-.277**	-.054**	-.613***	-.099***
21-23	-	-	-	-	-.244	-.041
≥ 18, 21, 24	a	a	a	a	a	a
Number of Siblings	-.009	-.017	-.042**	-.052**	-.047	-.045
Occupation of Head	-.002	-.040	.002	.029	-.000	-.009
Mother's Education	.026	.059	.041*	.063*	.047*	.060*
Father's Education	.015	.042	.025	.047	.055**	.084**
Intact Family	.268**	.075**	.018	.003	.024	.003
Home Culture Index	.218***	.149***	.275***	.126***	.330***	.129***
Parents' Educational Goal	.299***	.118***	.582***	.153***	.700***	.146***
Parent-Teacher Help	.024	.049	.111***	.155***	.140***	.156***
High School Curric.	.204**	.078**	1.045***	.268***	1.330***	.267***
Age in 1968	.038	.042	.025	.019	-.016	-.010
Race	-.019	-.005	-.052	-.009	-.009	-.001
South	-.259***	-.095***	.031	.008	.034	.007
Constant	9.44		9.48		10.05	
F	41.831		102.59		84.42	
R^2	.271		.545		.569	
N	1593.0		1386.0		1106.0	

* p <.05
** p <.01
*** p <.001

\- = not applicable
a = omitted category

Table 9: Partial Regression Coefficients (standardized and unstandardized) of Woman's Educational Attainment on Age at First Birth, Social and Demographic Factors and Family Background, by Age in 1976 (Panel Study of Income Dynamics)

Independent Variables		Age of Woman: Less than 35		Age of Woman: Greater Than or Equal to 35	
		b	betas	b	betas
Age at First Birth	≤ 15	-2.810***	-.163***	-3.070***	-.142***
	16-17	-2.430***	-.322***	-2.11***	-.278***
	18	-1.930**	-.223***	-1.74***	-.175***
	19-20	-1.550***	-.285***	-1.22***	-.207***
	21-23	-1.330***	-.241***	- .545***	-.099***
	≥ 24	a	a	a	a
Race (1 = white)		.084***	.012***	.991***	.179***
Father's Education	10	a	a	a	a
Father's Education	10-12	.465***	.103***	- .111	-.024
Father's Education	12	1.010***	.180***	1.14***	.142***
Mother's Education	10	a	a	a	a
Mother's Education	10-12	.724***	.161***	.655***	.143***
Mother's Education	12	1.370***	.227***	1.66***	.189***
Father's Occupation		.006	.061	.010**	.100**
Number of Siblings		- .046	- .046	-.166***	-.172***
Farm Background (1 = farm)		.139	.024	-.084	-.015
Foreign Background (1 = foreign)		1.56**	.081**	-.760**	-.069**
Southern Background (1 = southern)		- .079**	- .016	.119	.024
Age in 1976		- .017	- .024	-.067***	-.146***
Constant		13.171		14.500	
F		39.990		43.761	
R^2		.418		.366	
N		909		1229	

* = p < .05
** = p < .01
*** = p < .001

standardized coefficients for the age at first birth measures are among the largest in the equation. In each case, an early first birth produces a statistically significant educational loss. And in each case, the earlier the birth, the greater the loss relative to women who delay childbearing. Furthermore, the addition of the age at first birth variable significantly increases the variance in educational attainment explained. The R^2 increases by .05 ($p < .001$) among the NLS women and by .10 ($p < .001$) among the total PSID sample. Clearly the data support the hypothesis that the younger a female is when she takes on the responsibilities of motherhood, the less schooling she tends to complete, even when the impact of other factors is statistically controlled.

Other Factors that Affect Educational Attainment

While the effects of background factors on educational attainment have been described at length elsewhere and are not of primary importance here, our findings will be reviewed very briefly before proceeding to detailed examination of further hypotheses. Sewell and Hauser (1972) report that the number of years of schooling completed by a young man is positively influenced by the educational attainment of his father and his mother, by his father's occupation, parental encouragement, and college plans, among other factors. Results obtained with both data sets are quite similar in that the educational levels of the parents affect the daughter's attainment. However, in neither case does the occupation of the head of the household or the father affect the number of years of schooling completed.

Since the NLS data set includes far more information on determinants of educational attainment--parents' aspiration, high school curriculum, the presence of books and magazines in the parental home--it is not surprising that the NLS regression explains a greater proportion of the variance in attainment. Moreover, when these variables are included in the equation, there is no main

effect for race in the NLS analysis, as there is in the PSID analysis. Portes and Wilson (1976) in their study of schooling among teenage males also found no race effect once intervening variables were controlled for. The significant effect of a foreign background in the PSID but not in the NLS (the variable was discarded from the final regression) is probably also due to the greater availability of important control variables in the NLS data.

The impact of the size of the family of origin and whether it was intact on years of schooling completed is in close agreement with the effect of these factors reported by Blau and Duncan (1967) and Duncan, Featherman, and Duncan (1972). In addition, the measure of availability of reading materials in the parental home--the home culture index, which may be interpreted as an indicator of the importance to the parents of general education--has a strong positive effect net of the educational aspirations of the young woman and her parents. To summarize, the factors that have been found by others to influence years of schooling completed, though mostly derived from research on young men, are shown in our study to affect the attainment of young women in a similar fashion.

Catching Up: Do Early Childbearers Make Up for Lost Time?

We have hypothesized that the younger a woman is when she interrupts her schooling the harder it is for her to return later due to the physical, emotional, and economic demands of the role of mother, and in many cases, the role of wife. Teenage mothers may not only find that they are unable to catch up with their childless age peers, but that they are falling further and further behind.

The data presented in Tables 8 and 9 suggest that the gap between early childbearers and later childbearers remains large. Inter-column comparison of the metric coefficients in Table 8 by age at first birth indicates a substantial and sustained loss associated with early childbearing.[2] Indeed, the educational disadvantage of the youngest mothers, compared to those who have no children, is nearly twice as large at age 24 as it is at age 18--2.8 compared to 1.5 years.[3] In every case, the number of years of formal schooling lost due to parenthood increases as the age at which we measure her attainment (18, 21, 24) increases. If she were to begin catching up (by returning to school, for example) we would have expected this decrement to de ne. However, among women 35 or older, shown in Table 9, the loss due to an early birth remains substantial. Thus, it seems proper to conclude that early childbearing poses more than a temporary setback from which the young mother can eventually rebound. Among both recent and older cohorts of women, early childbearing seems

1. Comparisons within equations refer to standardized coefficients while comparisons between equations are based on metric coefficients (Blalock, 1967: 675-6).

2. There is no formal statistical test for differences between coefficients from different equations. Differences of .10 or more will be considered substantively significant.

3. The reader is reminded that the analyses of attainment at 18, 21, and 24 do not refer to precisely the same women. However, the inclusion in the equations of a measure of the year in which the woman became the relevant age (18, 21, or 24) in the form of her age in 1968 controls for some of the difference. While comparisons across age groups are valid they should be interpreted with some caution.

to produce persistent decrements in educational attainment. Analysis of transition probabilities provides additional insight into this question.

Transition Probability: School Re-entry. The detailed annual data on the young NLS women permits exploration of the impact of a first birth on transitions among young women, that is, changes in the young woman's status from interview to interview. To explore the "catching-up" hypothesis, a sample was created including all NLS women aged 16-26 who reported not being enrolled in school full-time at the time of the 1972 interview (n = 3696). Of this group, 23 percent are enrolled full-time one year later, at the time of the 1972 interview. The dependent variable for this analysis is a dichotomy: 1 = school re-entry; 0 = no re-entry. The probability that the respondent re-enters school is estimated as a function of respondent characteristics and as a function of the occurrence of certain events, such as a first birth. Results are expressed as adjusted probabilities, that is, the likelihood that a youn woman who is not enrolled in school wil re-enroll if she marries, if she has a child, if she receives welfare, etc., net of other factors.[1]

This analysis,summarized in Table 10, indicates that first birth status has statistically significant and quantitatively important direct effects on reentry rates. The highest reentry rate (.026) is displayed by childless women and women whose first birth occurred more than one year before the at-risk year. Reentry rates barely above zero are predicted for those women who experience a first birth within the previous year (.005) and only slightly higher rates for already married women with a current first birth (.013). Finally, reentry rates for women with premarital current first births or women who combine both a first birth and marriage in the current year are virtually zero.[2]

1. A more complete discussion of the transition probability strategy is included in the Methodological Appendix.

2. By the phrase "virtually zero" is meant that predicted value of the reentry rate is negative.

Table 10: The Probability of Re-entry Into School: Adjusted Transition Probabilities (National Longitudinal Survey)

	One Year (1971) Only	
	Proportion Of Sample	Reentry Probability
I. FIRST BIRTH		
More Than One Year Ago	.44	.026
Within Previous Year	.08	.005
Within Current Year and		
No First Marriage by End of Current Year	.006	0.
Uncertain Timing	.006	0.
Postmarital	.05	.013
No First Birth Yet	.42	.026
II. SELECTED OTHER CHARACTERISTICS		
Never Married	.31	.044
Ever Married	.69	.014
III. OTHER MAJOR CURRENT YEAR LIFE CHANGES		
Second or Later Birth	.09	.009
No Second or Later Birth	.91	.024
Marriage	.09	0.
Marital Split	.03	.026
Remain Married	.59	.026
Remain Not Married	.30	.026
Overall Mean Re-entry Probability	.023	
R^2	.06	
N	3,696.	

We conclude that a current first birth virtually eliminates school reentry unless the first birth occurs to a married women (as do about 85% of the current first year births for this sample) in which case reentry occurs at a rate that is only slightly below normal. Reduced school reentry rates persist for one year after the birth, but then return to normal levels within two years after the birth. A second or later birth also depress reentry rates during the year it occurs.

Reeintry is also dramatically affected by marital changes. A marriage, even without a first birth, reduces reentry to virtually zero. Thus, a current first birth has no detectable additional impact if a current marriage also occurs. However, as noted above, a first birth has a direct impact of its own, when not simultaneous with marriage.

One major interest in examining reentry was to search for a "catch-up" effect, whereby women who leave school prematurely in response to a birth or marriage perhaps return later and regain their expected educational attainment. We see no signs of that in the results above, since reentry rates for women with a first birth more than one year prior are normal, rather than above-normal. A measure of the number of children under six was also included in the model and exhibits a significant net negative impact on school reentry. Number of years out of school also has a significant negative effect on school reentry.

Nor does it appear that women who leave school early in response to marriage catch up. Never-married women's reentry rate is .044 compared to .014 for ever-married women. Marriage appears to have a continuing depressing effect on school reentry. Moreover, the evidence cited above suggests that early school exits due to childbearing are also permanent, since number of children under six and years out of school are negatively related to reentry.

This analysis is limited to women no older than 26. We conclude that at least up to age 26 early schooling exits due to marriage and/or childbearing are not reversed by higher reentry rates later on. While some women do return to school, married women and mothers do not do so in numbers that would allow them to catch up with other young women.

The Process of Educational Attainment Among Groups that Differ in Age at First Birth (NLS)

The occurrence of an early birth, we argue, is so important that it alters the process of educational attainment by creating groups of women for whom the process of educational attainment differs. That is, different factors determine educational attainment among young females who defer childbearing compared with girls who begin childbearing at very young ages. We test this argument by applying analysis of covariance techniques to the NLS sample of young women at age 24. This allows us to test the hypothesis that the slope or regression coefficients of the predictor variables differ significantly between groups.

Table 11 shows the standardized and unstandardized partial coefficients for the model of educational attainmnet at age 24, estimated within age at first birth categories. The analysis of covariance test for differential slopes between groups (Johnston, 1972: 198-207) indicates significant differences by age at first birth category in the effect of the independent variables on years of schooling completed ($F_{(44,1439)} = 7.76$; $p < .001$). The predictive power of the model, as measured by the R^2, is substantially lower for the earliest childbearers than for those who delayed motherhood until at least 21. Those factors that may be called indicators of motivation or support from others -- parental educational goal, high school curriculum, and parent/teacher help -- all have a much larger effect on the attainment of those who were

Table 11: Partial Regression Coefficients (Standardized and Unstandardized) Relating Educational Attainment at Age 24 to Family Background, Social and Demographic Factors, by Age at First Birth (National Longitudinal Survey)

Independent Variables	Respondent's Age at First Birth									
	≤17		18		19-20		21-23		No Child By Age 24	
	b	Beta	b	Beta	b	Beta	b	Beta	b	Beta
Number of Siblings	-.119	-.175	-.071	-.097	-.028	-.048	.005	.006	-.056	-.046
Occupation of Head	.002	.024	-.007	-.086	-.0C7	-.114	.006	.073	-.002	-.015
Mother's Education	-.034	-.057	.078	.146	.065	.134	.063	.096	.040	.046
Father's Education	.140*	.291*	.038	.072	.060	.145	.058	.112	.022	.030
Intact Family	.221	.058	.191	.045	.210	.052	-.301	-.053	-.042	-.005
Home Culture Index	.363*	.230*	.278	.183	.392***	.246***	.341**	.158**	.341**	.106**
Parents' Educational Goal	.636	.165	.640	.194	.205	.070	.403	.105	1.163***	.211***
Parent-Teacher Help	.076	.095	.016	.024	.047	.082	.058	.081	.260***	.260***
High School Curric.	-.676	-.122	.475	.112	.829***	.248***	1.450***	.370***	1.66 ***	.314***
Age in 1968	.023	.019	-.008	-.008	-.022	-.023	.047	.037	-.090	-.048
Race	-.202	-.050	-.169	-.035	-.478**	-.106**	.081	.012	.341	.035
South	-.017	-.005	-.628	-.186	.277	.092	.221	.052	.080	.014
Constant	8.15		10.02		10.23		8.48		10.69	
F	4.16		2.76		9.71		18.52		47.29	
R^2	.357		.290		.381		.513		.549	
N	107		94		202		224		479	

* = p < .05
** = p < .01
*** = p < .001

childless at 24 than on that of the young mothers.[1] The most striking example of this effect is shown by the pattern of the coefficients for a college-preparatory high school curriculum. For those who bore their first child at 17 or younger, being in a college prep curriculum in high school actually has a negative effect on years of school completed at 24. This effect becomes steadily more positive as age at first birth rises, so being in a college prep curriculum adds 1.5 years of education for respondents who became mothers at 21 to 23 and 1.7 years for those still childless at 24.

It is surprising that the family background factors found to be important in past studies--number of siblings, mother's and father's education and coming from an intact family--are not consistently predictive of educational attainment within age-at-first-birth categories. Only among young women who have borne a child by 17 do the number of siblings and father's education significantly influence the amount of schooling obtained by age 24. We feel that these factors capture the differing abilities of families of origin to cope with the burdens posed by their daughters' early childbearing. Families with fewer children, for example, should have more resources available to provide for a new baby and still enable the young mother to attend school. Similarly, families with well-educated fathers should have more resources to expend in handling difficulties posed by daughters' early childbearing. Among women bearing children in their twenties, most of whom have left home, the size and composition of the family of origin would understandably have less effect on their ability to continue schooling; motivational factors then become correspondingly more important.

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1. The sample sizes differ greatly between age at first birth categories making tests of significance difficult to interpret substantively. In these comparisons we will consider substantively significant, whether or not statistically significant, those coefficients which are equal to or larger than .10.

Being white has a negative net effect on education among the youngest mothers and a positive net effect among the childless, although in neither case are the coefficients statistically significant. We will return to this point later.

These results, when taken as a whole, lead us to the following conclusion. The factors that are important in the process of educational attainment differ substantially for those who bear a child in adolescence and those who delay motherhood. The characteristics of the family of orientation are most important to the eventual attainment of early childbearers.[1] Among those who postpone childbearing, measures of motivation and encouragement or help from others are the most important factors affecting years of schooling completed at age 24; these variables have much less effect for those who became mothers in their teens.

The Process of Educational Attainment Among Young Black and White Women (NLS)

We have hypothesized that black teenagers may actually suffer less of an educational disadvantage due to adolescent childbearing than do their white counterparts. Since teenage parenthood is much more common among blacks than among whites, we argued that social mechanisms for dealing with this occurrence may be better established among black families and in school systems with a high proportion of black students. Other evidence suggests that the presence of babies and young children seems to interrupt the lives of black women less than it does white women. For example, black women are more accepting of employment

1. We do not wish to suggest, of course, that family socioeconomic is unimportant to educational attainment among any of the age at first birth groups. The several measures of family background tend to be correlated, as one would expect (reaching a maximum correlation of .66 between mother and father's education), and a composite measure of the socioeconomic status of the family of orientation has a positive impact among all age at first birth groups. We have chosen to use the more specific measures here in the hope of capturing the process more precisely.

among mothers of young children than are white women (Suter and Waite, 1975) and actual participation rates reflect this difference in values (Bowen and Finegan, 1969).

To test this reasoning we estimated the model of educational attainment separately for whites and blacks. Results for NLS women at age 24 are shown in Table 12, while Table 13 displays the results for PSID women. The analysis of covariance test for differential slopes indicates significant differences between blacks and whites in both data sets in the effects of the independent variables on years of schooling completed [NLS: $F(17,1419 = 2.05$; $p < .05$. PSID: $F(16,2356) = 10.2$; $p < .001$], and our hypothesis receives strong support. A first birth at 15 or younger results in twice the educational decrement for NLS white women at age 24 as it does for young black women--3.1 versus 1.4 years of schooling, respectively. The comparable losses are 3.1 and 2.0 years for PSID women. At every age of first birth, the effect is much smaller for blacks in both data sets. Indeed the impact of a first birth at 19 or older is positive for blacks in the NLS analysis, an unexpected effect for which we have no ready explanation.) The coefficients for the other variables in the NLS model exhibit the patterns found by other researchers using similarly rich data sets: parental status as measured by father's education is somewhat more important for whites, while educational aspirations and help from others are more important for blacks (Portes and Wilson, 1976).

One could argue that the smaller negative impact of a birth during the early teens for blacks than for whites might just be due to the lower educational attainment of blacks in the United States. But a restriction in the range of education does not appear to be the explanation for this finding. While the mean years of schooling completed by NLS women at age 24 is somewhat lower for blacks than for whites (11.3 versus 12.6), the standard deviations are very

Table 12: Partial Regression Coefficients (Standardized and Unstandardized) Relating Educational Attainment at 24 to Family Background, Social and Demographic Factors, By Race (National Longitudinal Survey)

Independent Variables	Blacks		Whites	
	b	beta	b	beta
Age at First Birth				
≤15	-1.468**	-.151**	-3.110***	-.178***
16-17	- .751*	-.111*	-1.542***	-.176***
18	- .030	-.004	-1.029***	-.127***
19-20	.386	.059	- .755***	-.125***
21-23	.221	.032	- .309*	-.054*
≥24	a	a	a	a
Number of Siblings	- .038	-.043	- .053*	-.048*
Occupation of Head	- .007	-.038	- .000	-.004
Mother's Education	.064	.084	.047*	.060*
Father's Education	.008	.012	.058**	.088**
Intact Family of Origin	.481	.088	- .097	-.013
Home Culture Index	.433***	.190***	.309***	.115***
Parents' Educational Goal	1.249***	.242***	.575***	.123***
Parent-Teacher Help	.258***	.232***	.135***	.157***
High School Curriculum	.941**	.137**	1.341***	.279***
South	.072	.014	- .005	-.001
Age in 1968	.154	.085	- .034	-.021
Constant	4.834		10.731	
F_2	13.664		82.995	
R^2	.482		.569	
N	252.		1,022.	

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

Table 13: Partial Regression Coefficients (Standardized and Unstandardized) of Educational Attainment on Age at First Birth, Social and Demographic Factors and Family Background, by Race (Panel Study of Income Dynamics)

	Blacks		Whites	
	b	beta	b	beta
Age at First Birth				
≤15	-2.008***	- .185***	-3.143***	- .136***
16-17	-1.310***	- .226***	-2.539***	- .318***
18	- .517	- .073	-2.030***	- .205***
19-20	- .340	- .068	-1.530***	- .261***
21-23	- .699	- .110	- .914***	- .166***
≥24	a	a	a	a
Father's Education				
<10 years	a	a	a	a
10-12 years	.514	.145	.279**	.057**
>12 years	2.070***	.216***	.716***	.109***
Mother's Education				
<10 years	a	a	a	a
10-12 years	.730**	.194**	.651***	.137***
>12 years	1.330*	.122**	1.316***	.184***
Father's Occupation	- .024**	- .387**	.017***	.152***
Number of Siblings	- .023	- .030	- .160***	- .150***
Farm Background (1 = Farm)	- .502	- .102	.167	.029
Foreign Background (1 = Foreign)	.224	.008	- .639**	- .052***
Southern Background	- .570	- .157	- .153	- .027
Age in 1976	- .039**	- .191**	- .025***	- .083***
Constant	13.900		13.590	
F_2	5.500		92.980	
R^2	.224		.435	
N	302		1827	

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

similar (2.57 for blacks and 2.35 for whites). This explanation is more tenable with the PSID analysis, since the standard deviations differ more (1.76 for blacks versus 2.37 for whites). Replication of this finding on two national data sets, however, suggests that race may be a critical moderating factor in the impact of an early birth. Several subsequent analyses will therefore also be presented separately for blacks and whites.

Age at First Birth or Age at First Marriage?

Among teenagers who marry, pregnancy and birth are often precipitating factors, and it is often difficult to sort out the causal ordering. Even knowing the exact dates of conception and marriage would not allow one to be certain of the causal process, since a miscarriage can make a "shotgun" wedding seem like a "normal" wedding, while a decision to marry can precede conception, making a planned, desired wedding appear to be a post-conception wedding. A simple resolution of this question is therefore unlikely.

To provide a start toward the unravelling of this issue, Table 14 presents data on different patterns followed by NLS young women who had first births during the years 1968 through 1972. Perhaps the most important conclusion to be drawn from this table is the variety of patterns. For example, among 16-year-old mothers, 51 percent dropped out before the year of the birth; but among this 51 percent of the girls, 17 percent did not marry, 5 percent had married before the year of the birth, and 29 percent married in the year of the birth. Another 22 percent dropped out the same year as the birth; about half married and half did not. Finally, 9 percent dropped out the year after birth, while the remaining 17 percent continued in school for at least two years after their first child was born, meaning that at most only 26 percent of the 16-year-old mothers remained in school one year after their child was born.

When asked why they dropped out of high school, marriage and childbearing

Table 14: The Relative Timing of First Birth, Marriage, and the Termination of Education, by Age of Mother at Her First Birth: Births Occurring 1968-1972 (National Longitudinal Survey of Young Women)

	Preceding Years	The Year of the First Birth	The Year After the First Birth	Percent of All First Births at Each Age that Followed Each Pattern				
				Age 16	Age 17	Age 18	Age 19	Age 20
A.	Drop-out Marriage →	First Birth		5.3%	14.3%	21.6%	39.1%	51.3%
B.	Marriage →	First Birth →	Drop-out	0	1.6	0	0	.6
C.	Drop-out →	First Birth Marriage		28.9	30.2	45.6	33	25.6
D.	Drop-out →	First Birth No Marriage		17.0	12.7	11.7	11.7	9.0
E.		First Birth Drop-out Marriage		10.5	16.7	6.7	4.6	1.9
F.		First Birth Drop-out No Marriage		11.8	7.9	2.8	1.5	1.9
G.	Marriage →	First Birth Drop-out		0	1.6	2.2	1.5	1.9
H.		First Birth No Marriage →	Drop-out	6.6	.8	1.6	0	.6
I.		First Birth Marriage →	Drop-out	2.6	1.6	1.6	2.0	2.6
J.	Mother continues her education two or more years after first birth			17.1	12.8	6.0	6.6	4.5
				100.0%	100.0%	100.0%	100.0%	100.0%
		N =			76.	126.	197.	156.

were given as the reason by 56 percent of the white drop-outs and 62 percent of the black drop-outs. However, when marriage and childbearing are separated out, different racial patterns emerge. Nearly 47 percent of the black women cited pregnancy as their reason from dropping out, while only 7 percent of the white women did. On the other hand, only 15.3 of the black women cited marriage as a reason, while 49 percent of the white drop-outs gave marriage as an explanation (Mott and Shaw, 1978). This racial differentiation may reflect more a differential willingness to reveal a premarital pregnancy by the two groups than it does real differences in reasons for dropping out. Perhaps for this reason, Mott and Shaw lump marriage and pregnancy together in their discussion.

To address the question of the relative impact of age at first marriage versus age at first birth, dummy variables for each were included in multiple regressions of educational attainment for both NLS respondents (Table 15) and PSID respondents (Table 16). Four models were run for each data set. The initial regression includes neither age at first birth nor age at first marriage. The second includes only age at first marriage, while the third includes only age at first birth. Finally, both variables are included in the same regression.

When only one of the two variables is included in the equation, they seem to be almost interchangeable. Their effects are about the same. Addition of either one increases the R^2 by about 5 percentage points in the NLS and about 10 points in the PSID. The coefficients for age at first birth tend to be slightly larger in both tables, but not by much. Moreover, the coefficients for other variables in the model are about the same whether age at marriage or age at first birth is included. (The only exception is that the effect of the mother's education on her daughter's schooling is larger when age at marriage is an independent variable than it is when age at first birth is an independent variable.) Finally, when both variables are added to the equation

Table 15: Partial Regression Coefficients (Standardized and Unstandardized) of Educational Attainment at Age 24 on Family Background and Social and Demographic Factors, With and Without Age at First Birth and Age at First Marriage (National Longitudinal Survey)

Independent Variables	Without Age at First Birth and Without Age At First Marriage		With Age At First Marriage Only		With Age At First Birth Only		With Age At First Birth and Age At First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤ 15	-	-	-	-	-2.832***	- .182***	-1.920***	- .124***
16-17	-	-	-	-	-1.457***	- .172***	-1.007***	- .119***
18	-	-	-	-	- .935***	- .114***	- .706**	.086**
19-20	-	-	-	-	- .624***	- .101***	- .464**	- .075**
21-23	-	-	-	-	- .254*	- .043	- .254	- .043
≥ 24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤ 15	-	-	-2.824***	- .162***	-	-	-1.460**	- .084**
16-17	-	-	-1.181***	- .162***	-	-	- .425	- .058
18	-	-	.499**	- .073**	-	-	- .035	- .005
19-20	-	-	- .361*	- .066*	-	-	- .090	- .017
21-23	-	-	.228	.042	-	-	.328*	.061*
≥ 24	-	-	a	a	-	-	a	a
Number of Siblings	- .060*	- .057*	- .053*	- .051*	- .049*	- .047*	- .047*	- .046*
Occupation of Head	.000	.003	- .000	- .004	- .000	- .006	- .001	- .007
Mother's Education	.063**	.081**	.071***	.092***	.049*	.063*	.059**	.077**
Father's Education	.050*	.077*	.040*	.060*	.054**	.083**	.047*	.072*
Intact Family	.164	.024	- .034	- .005	.020	.003	- .046	- .007
Home Culture Index	.374***	.146***	.336***	.131***	.331***	.130***	.327***	.128***
Parents' Educational Goal	.684***	.142***	.664***	.138***	.631***	.631***	.633***	.132***
Parent Teacher Help	.169***	.188***	.144***	.161***	.143***	.160***	.140***	.156***
High School Curriculum	1.477***	.296***	1.320***	.265***	1.343***	.270***	1.310***	.263***
Age in 1968	- .037	- .022	- .033	- .020	- .014	- .009	- .021	- .013
Race	.105	.014	.270	.035	- .026	- .003	.078	.010
South	- .012	- .002	.088	.017	.026	.005	.057	.011
Constant	9.462		9.972		10.043		10.051	
F	96.917		82.622		83.580		66.842	
R^2	.516		.564		.566		.576	
N	1106		1106		1106		1106	

* = p < .05
** = p < .01
*** = p < .001

a = omitted category
- = omitted from regression

Table 16 Partial Regression Coefficients (Standardized and Unstandardized) of Educational Attainment on Age at First Birth, Social and Demographic Factors and Family Background, With and Without Age at First Birth and Age at First Marriage (Panel Study of Income Dynamics)

Independent Variables	Without Age at First Birth and Without Age at First Marriage		With Age At First Marriage Only		With Age At First Birth Only		With Age at First Birth and Age at First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤15	-	-	-	-	-2.867***	- .143***	-1.710***	- .086***
16-17	-	-	-	-	-2.230***	- .288***	-1.210***	- .156***
18	-	-	-	-	-1.700***	- .178***	- .898***	- .094***
19-20	-	-	-	-	-1.250***	- .214***	- .821***	- .141***
21-23	-	-	-	-	- .740***	- .132***	- .613***	- .109**
≥24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤15	-	-	-2.892***	- .228***	-	-	-1.830***	- .141***
16-17	-	-	-1.883***	- .315***	-	-	-1.050***	- .171***
18	-	-	-1.014***	- .151***	-	-	- .437*	- .063*
19-20	-	-	- .625***	- .117***	-	-	- .208	- .038
21-23	-	-	.162	.031	-	-	.203	.038
≥24	-	-	a	a	-	-	a	a
Race (1 = White)	.696***	.115***	1.055***	.174***	.775***	.128***	.973***	.161***
Father's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.027	.006	.126	.027	.098	.021	.108	.023
>12 years	.934***	.137***	.955***	.140***	.986***	.145***	.941***	.138***
Mother's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.940***	.204***	.600***	.130***	.608***	.132***	.574***	.124***
>12 years	1.880***	.253***	1.427***	.192***	1.383***	.186***	1.340***	.181***
Father's Occupation	.013***	.139***	.010***	.096***	.007**	.067**	.008***	.075***
Number of Siblings	- .127***	- .128***	- .117***	- .118***	- .127***	- .129***	- .123***	- .124***
Farm Background (1 = Farm)	- .010	- .002	.034	.009	- .009	- .002	.042	.007
Foreign Background (1 = Foreign)	- .009	- .001	- .303	- .023	- .338	- .026	- .374	- .029
Southern Background (1 = South)	- .061	- .021	.140	.028	- .004	- .001	.099	.020
Age in 1976	- .031***	- .108***	- .044***	- .155***	- .045***	- .158***	- .042***	- .147***
Constant	12.000		13.144		13.693		13.360	
F	79.350		89.549		84.380		70.460	
R^2	.291		.403		.389		.412	
N	2138		2138		2138		2138	

* = $p < .01$
** = $p < .05$
*** = $p < .001$

a = omitted category
- = omitted from regression

together, they seem to "divide up" the variance between them. The magnitudes of the coefficients for each variable are reduced substantially. The effect of age at first childbirth retains its statistical significance somewhat better and its coefficients remain slightly larger than those of age at first marriage; however both variables seem to be important.

Marriage, then, does appear to have a clear impact on school drop-out over and above that of a birth. Age at first marriage is not simply a variable that is a proxy for age at first birth or highly correlated with age at first birth; it has a separate and important impact in addition to the impact of age at first childbirth. However, on several occasions we have introduced the notion that the effects of marriage and childbirth differ for blacks and whites. Therefore, before reaching any final conclusions, it seems important to estimate separate models for each group, again adding the age at first marriage and age at first birth variables sequentially. Table 17 reports results of this analysis for NLS women, while Table 18 presents results for the PSID women.

Confirming our earlier analysis (based on Tables 12 and 13), age at first birth has a stronger negative impact among white women than among black women. In fact, when the age at marriage birth dummy variables are added, the coefficients for age at first birth remain strong and statistically significant among whites but fall to non-significance among black women. In part, the loss of significance is due to the relatively small black sample size. However, this is not the complete explanation, since the incidence of marriage and motherhood is similar, and age at first marriage does remain significant among blacks, at least in the PSID analysis.

Among young black women in the NLS regression, only those births occurring at the youngest ages are associated with educational decrements, a trend that

Table 17: Partial Regression Coefficients (Standardized and Unstandardized) Relating Educational Attainment at 24 to Family Background, Social and Demographic Factors, By Race (National Longitudinal Survey)

Independent Variables	Whites							
	Without Age at First Marriage or Age at First Birth		With Age at First Marriage Only		With Age at First Birth Only		With Age at First Birth and With Age at First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤15	-	-	-	-	-3.110***	- .178***	-1.852***	- .106***
16-17	-	-	-	-	-1.542***	- .176***	- .980***	- .112***
18	-	-	-	-	-1.029***	- .127***	- .760	- .094***
19-20	-	-	-	-	- .755***	- .125***	- .569***	- .094***
21-23	-	-	-	-	- .309*	- .054*	- .294*	- .051*
≥24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤15	-	-	-3.037***	- .175***	-	-	-1.657**	- .096**
16-17	-	-	-1.293***	- .181***	-	-	- .552*	- .077*
18	-	-	- .616***	- .093***	-	-	- .896	- .014
19-20	-	-	- .467**	- .089**	-	-	- .137	- .026
21-24	-	-	.159	.030	-	-	.270	.052
≥24	-	-	a	a	-	-	a	a
Number of Siblings	- .065**	- .060**	- .057*	- .053*	- .053*	- .048*	- .052*	- .048*
Occupation of Head	.001	.011	.000	.001	- .000	- .004	- .000	- .005
Mother's Education	.061**	.077**	.068**	.086**	.047*	.060*	.038**	.073**
Father's Education	.057**	.087**	.046*	.071*	.058**	.088**	.031*	.079*
Intact Family of Origin	.063	.009	- .138	- .019	- .097	- .013	.152	- .021
Home Culture Index	.384***	.129***	.304***	.113***	.309***	.115***	.300***	.111***
Parents' Educational Goal	.583***	.124***	.578***	.123***	.575***	.123***	.572***	.122***
Parent-teacher Help	.164***	.189***	.136***	.157***	.135***	.157***	.131***	.152***
High School Curriculum	1.504***	.313***	1.335***	.278***	1.341***	.279***	1.311***	.273***
South	- .046	- .009	.049	.009	- .005	- .001	.020	.004
Age in 1968	- .058	- .036	- .050	- .031	- .034	- .021	- .039	- .024
Constant	10.200		10.930		10.731		10.840	
F_2	96.920		82.600		82.995		65.468	
R^2			.568		.569		.579	
N	1022		1022		1022		1022	

* = p <.05
** = p <.01
*** = p <.001

a = omitted category
- = omitted from regression

Table 17: Continued

Independent Variables	Blacks							
	Without Age at First Marriage or Age at First Birth		With Age at First Marriage Only		With Age at First Birth Only		With Age at First Birth And Age at First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤15	-	-	-	-	-1.468**	- .131**	-1.291*	- .133*
16-17	-	-	-	-	- .751*	- .111*	- .666	- .098
18	-	-	-	-	- .030	- .004	.048	.006
19-20	-	-	-	-	.386	.059	.377	.058
21-23	-	-	-	-	.221	.032	.146	.020
≥24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤15	-	-	-1.690*	- .104*	-	-	-1.091	- .067
16-17	-	-	- .621	- .083	-	-	- .021	- .002
18	-	-	- .028	- .004	-	-	.063	.008
19-20	-	-	.285	.046	-	-	.077	.013
21-23	-	-	.302	.080	-	-	.505	.081
≥24	-	-	a	a	-	-	a	a
Number of Siblings	- .046	- .052	- .045	- .051	- .038	- .043	- .037	- .041
Occupation of Head	- .008	- .042	- .009	- .050	- .007	- .038	- .008	- .044
Mother's Education	.075	.098	.095	.124	.064	.084	.075	.097
Father's Education	- .011	- .015	- .022	- .031	.008	.012	- .002	- .002
Intact Family of Origin	.563	.103	.403	.073	.481	.088	.384	.070
Home Culture Index	.465***	.204***	.458***	.201***	.433**	.190**	.448**	.197**
Parents' Educational Goal	1.487***	.289***	1.359***	.264***	1.249***	.242***	1.231***	.239***
Parent-Teacher Help	.272***	.246***	.271***	.244***	.258***	.232***	.258***	.232***
High School Curriculum	.977**	.142**	.868*	.126*	.941**	.137**	.897*	.131*
South	.086	.016	.193	.037	.072	.014	.141	.027
Age in 1968	.123	.068	.110	.060	.134	.085	.138	.076
Constant	5.202		5.330		4.834		5.078	
F_2	17.418		13.084		13.664		10.610	
R^2	.644		.471		.482		.492	
N	252		252		252		252	

* = p < .05
** = p < .01
*** = p < .001

a = omitted category
- = omitted from regression

Table 18: Partial Regression Coefficients (Standardized and Unstandardized) of Educational Attainment on Age at First Birth, Family Background, Social Factors and Demographic Factors, by Race (Panel Study of Income Dynamics)

Independent Variables	Whites							
	Without Age At First Birth or Age at Marriage		With Age At First Marriage Only		With Age At First Birth Only		With Age At First Birth and Age at First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤15	-	-	-	-	-3.143***	- .136***	-1.743***	- .076***
16-17	-	-	-	-	-2.539***	- .318***	-1.430***	- .179***
18	-	-	-	-	-2.031***	- .205***	-1.132***	- .114***
19-20	-	-	-	-	-1.530***	- .261***	-1.089***	- .186***
21-23	-	-	-	-	- .914***	- .166***	- .765***	- .139***
≥24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤15	-	-	-3.332***	- .259***	-	-	-2.174***	- .169***
16-17	-	-	-2.335***	- .391***	-	-	-1.326***	- .222***
18	-	-	-1.457***	- .220***	-	-	- .620**	- .094**
19-20	-	-	-1.120**	- .221***	-	-	- .496**	- .093**
21-23	-	-	- .302*	- .055*	-	-	- .047	- .008
≥24	-	-	a	a	-	-	a	a
Number of Siblings	- .188***	- .176***	- .149***	- .139***	- .160***	- .150***	- .145***	- .136***
Father's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.063	.013	.322**	.066**	.279**	.057**	.324**	.066**
>12 years	.668***	.102***	.755***	.115***	.717***	.109***	.722***	.110***
Mother's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.998***	.208***	.675***	.142***	.651***	.137***	.608***	.128***
>12 years	1.831***	.257***	1.366***	.191***	1.316***	.184***	1.256***	.176***
Father's Occupation	.025***	.216***	.020***	.175***	.017***	.152***	.018***	.154***
Farm Background	.225	.039	.213	.037	.167	.029	.189	.032
Foreign	- .196	- .016	- .578**	- .047**	- .639**	- .052**	- .685**	- .056**
Southern Background	- .320**	- .057**	.015	.003	- .153	- .027	- .001	- .000
Age in 1976	- .014*	- .048*	- .028***	- .094***	- .025***	- .083***	- .027***	- .092***
Constant	11.965		13.705		13.590		13.856	
F_2	83.449		92.800		92.980		77.370	
R^2	.314		.433		.435		.460	
N	1837		1837		1837		1837	

* = pc.05
** = pc.01
*** = pc.001

a = omitted category
- = omitted from regression

Table 18: Continued

Independent Variables	Blacks							
	Without Age at First Birth or Age At Marriage		With Age At First Marriage Only		With Age At First Birth Only		With Age At First Birth and Age At First Marriage	
	b	beta	b	beta	b	beta	b	beta
Age at First Birth								
≤15	-	-	-	-	-2.008***	- .184***	-1.257	- .116
16-17	-	-	-	-	-1.310***	- .226***	- .583	- .100
18	-	-	-	-	- .517	- .073	.246	.035
19-20	-	-	-	-	- .340	- .068	.371	.074
21-23	-	-	-	-	- .699	- .110	- .355	- .056
≥24	-	-	-	-	a	a	a	a
Age at First Marriage								
≤15	-	-	-2.587***	- .253***	-	-	-2.439***	- .240***
16-17	-	-	-2.074***	- .388***	-	-	-2.359***	- .441***
18	-	-	-1.336*	- .189*	-	-	-1.860**	- .263**
19-20	-	-	-1.295*	- .259*	-	-	-1.897**	- .379**
21-23	-	-	- .620	- .166	-	-	-1.114	- .298
≥24	-	-	a	a	-	-	a	a
Number of Siblings	.023	.030	- .001	- .001	- .023	- .030	- .010	- .013
Father's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.302	.141	.627	.176	.514	.145	.994*	.280*
>12 years	1.695**	.177**	2.340***	.244***	2.071***	.216***	2.819***	.294***
Mother's Education								
<10 years	a	a	a	a	a	a	a	a
=10-12 years	.832**	.222**	.891**	.237**	.730**	.194**	.908**	.242**
>12 years	1.711**	.156**	1.930**	.176**	1.333*	.122*	1.875**	.171**
Father's Occupation	- .014	- .232	- .039**	- .630**	- .023**	- .387**	- .052***	- .846***
Farm Background	- .660*	- .134*	- .386	- .078	- .302	- .102	- .392	- .080
Foreign	.377	.020	.415	.014	.224	.008	.162	.005
Southern Background	- .337	- .093	- .762*	- .210*	- .570	- .157	- .829**	- .229**
Age in 1976	- .030*	- .146*	- .032*	- .156*	- .039**	- .191**	- .032*	- .157*
Constant	12.410		14.485		13.897		15.240	
F	6.053		6.352		5.503		5.372	
R^2	.172		.250		.224		.277	
N	302		302		302		302	

* = p <.05
** = p <.01
*** = p <.001

a = omitted category
- = omitted from regression

is replicated in the PSID regression. The negative impact of an early marriage noted among PSID black women is not replicated, however. This may be due to a weakening of the negative impact of marriage over time, since the same trend is apparent when comparing older PSID white women with the younger NLS white women. The addition of age at marriage does not result in any major changes in the effects of other variables on educational attainment; but it does improve slightly the variance explained by these regressions, particularly for the PSID black women.

In sum, early childbearing appears to have a stronger negative impact on schooling among whites than blacks, while early marriage has a negative impact on on both whites and blacks.[1] Almost without exception, the earlier the birth or marriage, the more negative the impact on education. There is some suggestion of a lessening of the impact of an early marriage on education over time, but little reduction in the impact of an early birth can be noted. This seems reasonable, since combining school attendance with marriage has seemed to become more feasible over the years, while little has changed over time to make the emotional and economic demands of motherhood more compatible with school enrollment.

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1. The racial difference in these results seem to be at odds with the stated reasons given by the young women when they were asked why they had dropped out. Whites, as noted on page 41, cited marriage most frequently, while blacks tended more to give childbirth as their explanation. This is undoubtedly due in part to the greater frequency of marriage among whites, who are able to ascribe their drop-out to marriage, although pregnancy is really the reason for both the marriage and the drop-out. Another partial explanation probably lies in the greater tendency of black mothers to remain in school through the birth of their child (see Figure 2); these mothers were not asked the drop-out question but they do appear in our analysis sample.

Causality

As noted above, over half the young women interviewed by the NLS research staff cited either marriage or pregnancy as the reason that they quit school. However, since we suspect that pregnancy is the factor that precipitated many of these school-age marriages, we wish to explore this issue further. Other data presented by Mott and Shaw (1978) support this suspicion.

Since Mott and Shaw were able to return to the actual NLS interview schedules and develop codes for the month as well as the year of particular events, they were able to graph the parent status of young women relative to the month that they terminated schooling (see Figures 1 and 2). As Figure 1 reveals, about 5 percent of white drop-outs are already mothers when they leave school, as are about 20 percent of the blacks. By nine months after leaving school, nearly a quarter of the white drop-outs have become mothers, while 45 percent of the black drop-outs have. Figure 2 reports the proportion remaining in school during the nine months of pregnancy and nine months post-partum. The proportion enrolled declines steadily as the pregnancy proceeds, falling to about 25 percent for blacks at birth and 10 percent for whites. Clearly, pregnancy and childbirth affect school enrollment. Can we measure their impact more precisely?

Two distinct strategies were employed to approach the question of the causal impact of an early birth or an early marriage on educational attainment. The transition probabilities strategy will be discussed first. Then results from two-stage least squares models specifying simultaneous causality will be presented.

Figure 1 Parent Status by Enrollment Status and Race for High School Dropouts and Graduates

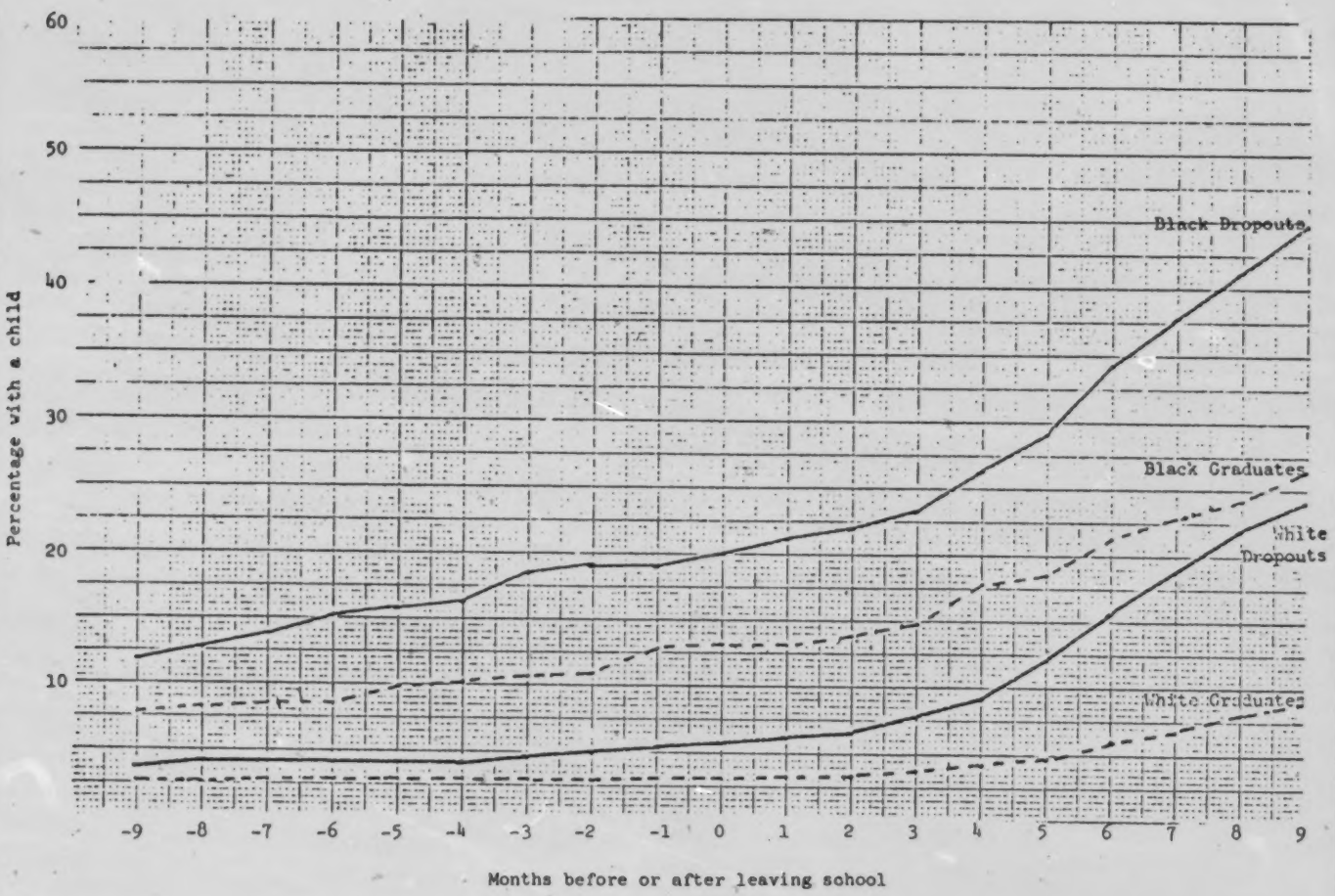
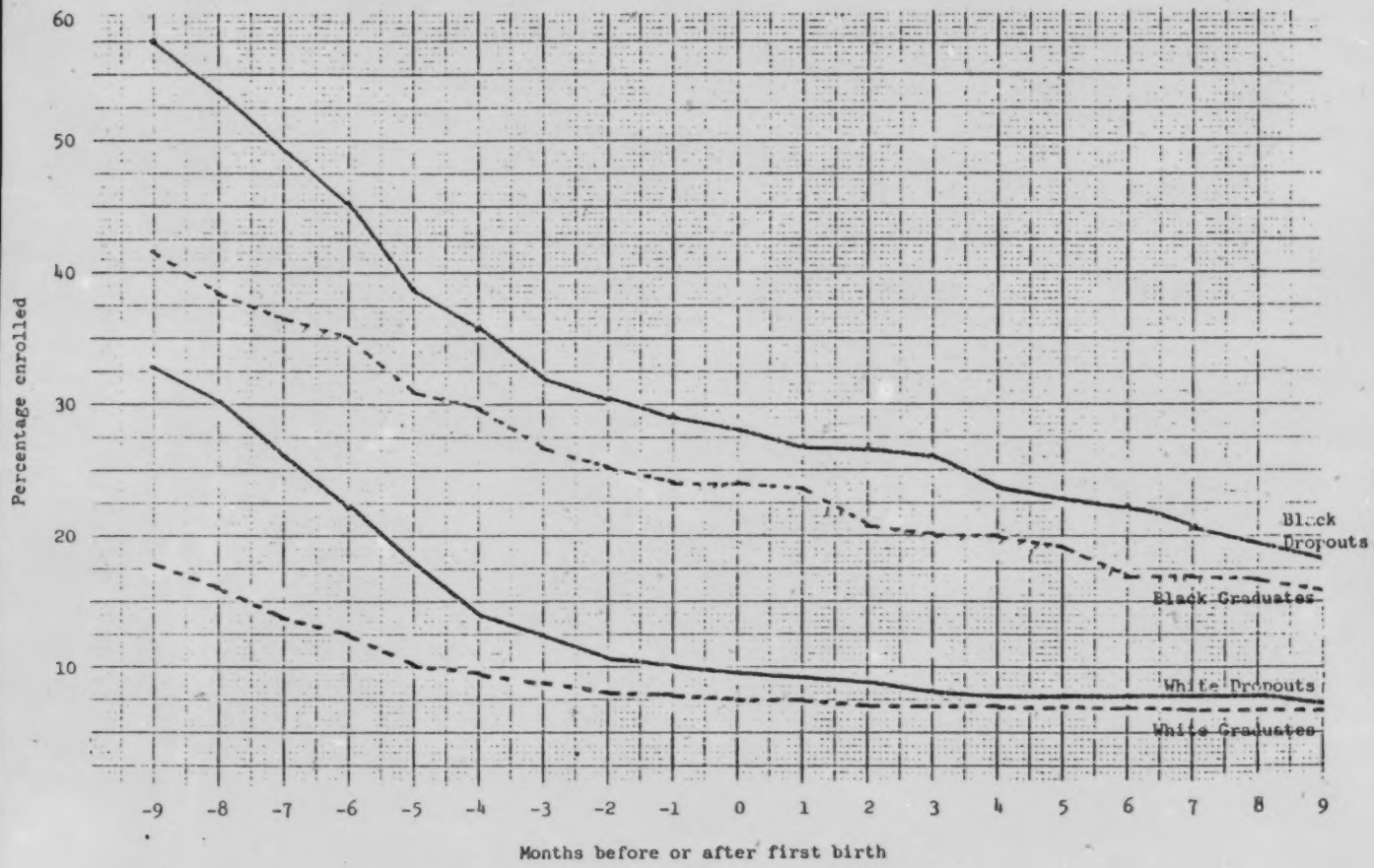


Figure 2 Enrollment Status by First Birth Status and Race for High School Dropouts and Graduates



Transition Probabilities: School Drop-out.

The detailed annual data on the young NLS women permit exploration of the impact of a first birth on the probability that a young woman enrolled in school will leave school. Although less information is available on school-age PSID respondents, a similar if more limited analysis is also possible with that data set. The dependent variable for these analyses is a dichotomy in which 1 = schooling termination and 0 = schooling continuation. The probability that a young woman leaves school during the year between two interviews -- the transition probability -- is estimated as a function of respondent characteristics as well as the occurrence of certain events, such as a first birth or marriage. Again, results are expressed as adjusted probabilities, that is, the likelihood that a young woman will leave school if she marries or has a child, net of the influence of other factors.

The National Longitudinal Survey. Because the determinants of dropping out of school are expected to differ among students enrolled at different levels, separate analyses were conducted for different groups. In the NLS analyses, separate regressions were run among students enrolled in school at each of five distinct levels. Each level represents a particular number of completed grades, as follows:

(1) some high school: up to eleven completed grades

(2) high school graduate: twelve completed grades

(3) some college: more than twelve but fewer than sixteen completed grades

(4) college graduate: sixteen grades completed

(5) post-graduate: more than sixteen grades completed

These five levels of schooling define five corresponding kinds of school exit, one from each schooling level. We assume that for all women within a particular level of school, the process of dropping out of that level can be

described by a single model; but a different model is required to describe each of the five distinct processes of school exit. Each model describes the influences on school exit for women who are at a particular level. The five types of exit are as follows:

(1) exit from high school before graduation

(2) exit after high school graduation

(3) exit from college before graduation

(4) exit after college graduation

(5) exit from post-graduate school

We operationalize the concept of level by measuring completed grades at the start of the year at risk of exit. Since the NLS interviews were conducted in the spring of each year, we assume that all persons enrolled full-time in school at one survey date could have completed one additional year of schooling by the next survey. Thus women eligible for exit type (1) are those women with ten or fewer grades completed and enrolled full-time in school at the start of the year at risk. Eligibles for exit (2) are women with eleven grades completed. Eligibles for exit (3) are women with 12-14 grades completed. Eligibles for exit (4) are women with fifteen grades completed, and eligibles for exit (5) are women with sixteen or more grades completed at the start of the year at risk.

The binary dependent variable in each case measures whether or not a woman who is enrolled full-time in a particular level of school at the start of a year at risk is still enrolled full-time in school at the time of the next year's interview. If she is not enrolled full-time in school at the next interview, she is defined as an "exit" from school and the value of the binary dependent variable is set equal to 1. If she reports that she is still enrolled

full-time in school at the next interview, she is assigned a zero.[1] Adjusted probabilities are presented in Table 19. Actual regression coefficients are reported in Appendix Tables 3-7.

School Exit Among Women With Ten or Fewer Years Completed. Of the pooled sample (n = 3462) of women enrolled in level (1) -- some high school -- about 10 percent are no longer enrolled full time by the following interview.[2] The exit rate is directly affected by a woman's first birth status, but even more so by changes in marital status. From Table 19 we see that for 95 percent of these women, no first child has yet been born, and the drop-out rate is 9 percent. For the 1.7 percent who had a first child more than a year prior to the start of the year at risk and who are still in school, the drop-out rate is also 9 percent, so that after one year has passed no continuing pressure to exit from school seems to be exerted by a first child. However, a woman who experienced a first birth within the previous year has a considerably higher expected drop-out rate of .25, presumably reflecting the pressures of combining school attendance with childrearing.

The sharpest increase in exit rate is displayed by the 2.4 percent of women in the sample who report a first birth during the year at risk of school exit; but the increases depend very much on the timing of the birth with respect to marriage. The lowest exit rate for those with a current first birth is

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1. Note that the dependent variable used in this analysis does not measure grade completion, but rather measures whether full-time school enrollment is discontinued. Of the women who are designated as drop-outs, some will have completed an additional grade during the year at risk, while others will not have completed the next higher grade. Moreover, of those who remain enrolled full-time in school, some will have completed another grade but some will not have completed any additional grade. While strongly correlated with grade completion, the school exit dependent variable is not identical with a grade completion variable. The association between grade completion and school exit is shown in Appendix Table .

2. Note that this group of at risk women is not replenished, unlike the other four groups at risk. The size of the at risk group diminishes sharply. Roughly 1,730 women are at risk in the first year, 1,200 in the second year, 480 in the third year, and 52 in the final year.

Table 19: The Probability of an Exit from School: Adjusted Transition Probabilities (National Longitudinal Survey)

Independent Variables	Ten or Fewer Grades Completed		Eleven Grades Completed		Twelve to Fourteen Grades Completed		Completed 15 Years		Completed 16 or More Years	
	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability
I. FIRST BIRTH										
More than one year ago	.017	.09	.029	.30	.038	.19	.052	.72	.070	.24
Within previous year	.009	.25	.013	.48	.009	.19	.024	.25	.020	.24
Within the current Year and	.024	-	.023	-	.017	-				
Premarital	.014	.23	.005	.50	.001	.19	0.	-	0.	-
Uncertain timing	.008	.77	.013	.82	.008	.73	.004	.80	0.	-
Postmarital	.001	.39	.005	.43	.008	.55	.031	.53	.010	.24
No first birth yet	.950	.09	.935	.48	.937	.19	.890	.72	.900	.24
II. SELECTED CHARACTERISTICS AT START OF CURRENT YEAR										
Worked in previous year	.457	.11	.651	.40	.749	.22	-	-	-	-
Did not work in previous year	.543	.09	.349	.62	.251	.16	-	-	-	-
Received public assistance	.061	.10	.041	.48	.022	.29	-	-	-	-
Did not receive public assistance	.939	.10	.959	.48	.978	.20	-	-	-	-
Never married	-	-	-	-	-	-	.780	.70	.540	.24
Ever married	-	-	-	-	-	-	.220	.70	.460	.24
III. MAJOR CURRENT LIFE CHANGES										
Second or later birth	.004	.23	.007	.32	.007	.39	.009	.70	.020	.24
No second or later birth	.996	.10	.993	.48	.993	.20	.991	.70	.980	.24
Marriage in current year	.034	.78	.087	.76	.160	.32	.220	.82	.110	.46
Marital split in current year	.002	.35	.003	.30	.007	.22	.005	.76	.010	.19
Remain married	.004	.35	.022	.50	.065	.22	.189	.76	.380	.19
Remain unmarried	.960	.07	.888	.45	.769	.17	.586	.63	.500	.23
Overall mean probability		.10		.48		.20		.70		.24
R^2		.25		.35		.07		.18		.19
N		3,462.		1,903.		2,208.		387.		213.

- = omitted from regression

exhibited by the 1.4 percent for whom the birth is clearly premarital, in that no first marriage has occurred by the end of the year. For this group the probability of exit is 23 percent. A substantially higher exit probability, 39 percent, is exhibited by those whose first birth is clearly postmarital, i.e., who were already married by the start of the year. However, dramatically higher school exit rates occur among women whose timing in uncertain, i.e., those to whom both a first birth and a first marriage occurred within the current year. For this group, almost 1 percent of the sample, a 77 percent drop-out rate, net of other relevant factors, was observed.

At the very least, these results suggest that marital status at the time of first birth conditions the impact of a first birth on schooling. They also emphasize the importance of marriage per se in increasing the probability of school drop-out. For example, of the women who marry during the year at risk of school exit, fully 78 percent leave school, compared to 7 percent of women who remain single during the year. Of course, perhaps a third of the teenagers who marry are already pregnant (Bureau of the Census, 1978), making it difficult to disentangle the effects of marriage from the effects of pregnancy. Analyses of women who are married and remain married at this level and at later levels suggest that married women who do not have a child during the year experience intermediate probabilities of school leaving. That is, they drop out more often than single women but less often than women who both marry and become mothers. This suggests a rough ordering among high school age women in the likelihood of leaving school. Those who are neither wives nor mothers are most likely to remain in school. Those who become mothers but do not marry are nearly three times as likely to drop out. Those who marry but do not bear a child (though some proportion are undoubtedly pregnant) and those who both marry and bear a child have the highest probability of dropping out; nearly 4 in 5 of these women drop out.

School Exit After High School Graduation. The results shown in Table 19 indicate that, overall, 48 percent of the NLS sample (n = 1903)[1] leave the school system between high school and college. Of the 52 percent who do not exit, 41 percent report having completed high school in the risk year, while 11 percent have not completed high school by the end of the year. Thus, roughly four-fifths of those who remain in school actually make the transition to college. First birth status has some direct impact on school exit at the second level, but less impact than at the first level, and once again, marriage alone, more than a first birth alone creates a powerful pull out of school, while the combination of marriage and birth produces the highest exit rate.

Childless women, women who have had a first birth within the previous year and who are still in school, and women who have a postmarital current year first birth all have approximately "normal" school exit rates. Women who have had a first birth more than a year before have subnormal net exit rates. We hypothesize that women who have had a birth yet survived in school have above-average determination to remain, and succeed in more than overcoming the obstacles to combining childrearing with full-time school (roughly 3 percent of the sample is in this situation). However, women who combine a current first birth with a current marriage have an extremely high exit probability--82 percent. Marriage alone generates a slightly lower proportion--76 percent, though again many of these brides are pregnant. Women who are already married (net of first birth status) by the current year have slightly higher exit rates--50 percent. Thus, we conclude that among those young women who continue despite marriage or birth, these events do not appear to have significant continuing impacts on

1. Note that virtually no pooling of observations, and thus negligible auto correlation, occurs for this sample.

school exit after the year of occurrence. Indeed, as discussed above, women who manage to remain in school during the first two years of life of their first child have lower exit rates than the sample as a whole.

Once again, first birth status is likely to have a significant indirect effect, increasing school exit rates at this level through its impact on first marriage chances.

School Exit During College. Twenty percent of the pooled sample (n = 2208) of college women report leaving college by the time of the next year's interview. Only a current first birth combined with a marriage or else one which occurs to an already married woman act to increase college drop-out rates directly. Approximately normal exit rates are displayed by women with a prior first birth, women who are childless, and unmarried women who experience a current year first birth. But 73 percent of the women who experience both a current year first birth and a current year marriage leave college. Married women who experience a current first birth also have a relatively high drop-out probability of 55 percent.

Once again, the message seems unequivocal. A first birth combined with marriage is considerably less favorable to chances of continuing school than a first birth which is not combined with a marriage. A current marriage by itself increases the college drop-out rate to 32 percent, but this effect is less dramatic than it was among high school women. Those women who begin and end the year unmarried have significantly lower exit rates (.17). On the whole, the effect of marital change is somewhat less dramatic at this stage of school, though marriage remains an important direct influence.

School Exit (a) After College Graduation and (b) During Postgraduate School.

The two final transitions have substantially fewer observations with which to estimate and test appropriate models. Yet we have not combined the two

samples, since we hypothesized earlier that they define two distinct transitions that may be influenced by different factors.

Seventy percent of our sample (n = 387) discontinue full-time school after college. Given the small samples significant effects are more scarce and estimation efficiency is much lower. Therefore, will only discuss the direction of the findings. First birth status appears to have direct impacts as follows: a first birth within the previous year is related to a net decrease in exit rates, as is a current first birth which occurs to an already married woman or to an unmarried woman. Once again, if both first birth and marriage occur in the current year, the school leaving rate is significantly higher.

Marriage by itself increases drop-out rates, but the increase, though significant, is small. Unmarried women who remain unmarried through the year at risk have lower net exit rates. In sum, these results, though based on considerably fewer observations than the first three stages, are fairly consistent with results from those stages.

Finally, of our small sample (n = 213) of postcollege women, one-quarter drop out of school annually. For the first time there is no statistically significant impact of first birth status on the drop-out rate. However, once again, a current year marriage increases the drop-out rate substantially, net of background variables and other current life changes.

Panel Study of Income Dynamics. Since the Panel Study was designed to provide information on the economic behavior of households, this is very little information on the behavior of individuals who are still minors. Consequently, only a very limited transition probability analysis can be conducted. Results from this limited analysis are presented in Appendix Table 8. Adjusted probabilities for selected variables are presented in Table 20 by way of a summary.

Table 20: The Probability of an Exit From School: Adjusted Transition Probabilities (Panel Study of Income Dynamics)

	Age 15-16		Age 17-18		Age 19-20	
	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability	Proportion Of Sample	Exit Probability
I. FIRST BIRTH						
First Birth in Current Year	.04	.15	.08	.41	.05	.21
First Birth in Previous Year	.05	.14	.04	.39	.07	.39
First Birth Two Years Ago			.02	.07	.05	.29
First Birth Over Two Years Ago			.02	.01	.10	.39
No First Birth Yet	.01	.04	.84	.26	.73	.31
II. SELECTED OTHER CHARACTERISTICS						
Married at Start of Year	.04	.01	.07	.40	.28	.25
Not Married	.96	.05	.93	.26	.72	.35
Worked > 30 Hours in Previous Year	.04	.00	.43	.29	.54	.34
Worked < 30 Hours in Previous Year	.96	.05	.97	.25	.46	.30
Received AFDC in Previous Year	.03	.15	.03	.13	.02	.32
Did Not Receive AFDC	.97	.05	.97	.27	.98	.32
Overall Mean Transition Probability		.05		.27		.32
R^2		.079		.101		.214
N		510.		612.		397.

Among PSID young women, as among the NLS young women, a first birth has a significant impact on the probability of dropping out of school, particularly among the younger mothers. For the girls age 15-16, a first birth in the current year raises the drop-out probability from .05 to .15. Even a birth in a previous year increases the likelihood of leaving school to .14. Among the 17-18 year olds, a current birth increases the drop-out probability from .27 to .41, and a birth in the previous year increases it to .39. Interesting enough, a birth more than two years ago is associated with a lower probability of school-leaving. Presumably, those young mothers who have stayed in school several years past the birth of a child are particularly motivated. A first birth has no statistically significant impact on school exits among women enrolled at ages 19-20.

In this analysis, young women who are employed are less likely to drop out, suggesting that employment serves less as a substitute for education than a facilitator of school enrollment. As in our other regressions, welfare status does not have a significant impact. Marital status at the start of the year at risk does not affect the probability of dropping out. Presumably, a measure of the occurrence of a marriage during the year at risk, as in the NLS analysis, would have registered some impact. While this analysis is considerably less satisfying than the NLS analysis, it does confirm the association between a birth and school drop-out noted in the NLS data.

School Exit: Conclusions. Several important summary conclusions should be noted. First, among women enrolled in high school, marriage per se and even more so marriage combined with childbearing seem to greatly increase the probability of school drop-out. Women who bear a child but do not marry have a lower probability of dropping out than women who marry. Of course, the lowest drop-out probabilities are found among those high school students who neither marry nor

have a child. Among women with at least 12 years of schooling, the impact of a birth still remains substantial.

In analyses presented thus far, we have assumed that it is the woman's fertility behavior that is the causal factor, that the occurrence of a pregnancy forces her to leave school when she would have otherwise have continued with her education. It is of course possible that some teenage women drop out of school and then, having completed their student days, assume the roles of adulthood, including motherhood. In this case, childbirth cannot be said to cause school drop-out. Drop-out may "cause" motherhood. After finishing her formal education -- high school, college, or grad school -- the woman initiates childbearing. Indeed, this is the typical pattern and suggests the need to explore the association within two-stage causal models that operationalize both sets of causal hypothesizes. Specifically, one hypothesis is that an early birth causes the termination of schooling. On the other hand, the longer a woman attends school, the longer she may put off marriage and childbearing; and in this sense, schooling can be said to cause delay of the first birth. It is our expectation that causality operates in both directions, though the particular direction may depend on the sample of women who are being considered.

Causal Model Results

Cross-tabulations of age at first birth by age at termination of schooling indicate that only among childbearers aged 18 and under does either pregnancy or childbearing precede school drop-out in a substantial number of cases. Of those young women who have a first birth while 16 to 18, for example, 70 percent drop out of school within a year of that birth (either one year before, in the same year, or in the following year). Of those who have a first birth between 19 and 21, only 25 percent finish their schooling within one year of the birth. Most women who are 19 or older when they have their first child have terminated their schooling before the birth. Given the importance of a high school diploma on the

job market, the effect of terminating schooling on later life chances should be much greater if that termination occurs before high school graduation.

Thus, although we predict a simultaneous relationship between education and the age at which a woman bears her first child in the full sample, we expect the effect of age at first birth to predominate among those who bear their first at age 18 and under. Among those who bear their first child at age 19 or older, we expect the effect of education on age at first birth to dominate. To capture these expectations, we have specified simultaneous causality between age at first birth and educational attainment not only for the total sample, but also for two subsamples, (1) women 18 or younger at the time of their first birth, and (2) women 19 or older at first birth.

Estimation of the Non-Recursive Link Between Education and Age at First Birth

Results from these analyses are summarized in Table 21 for NLS respondents and Table 22 for PSID respondents. In addition, the results are displayed in path model form in Figures 3 and 4. The full discussion of the work done on causal models is discussed elsewhere (see Hofferth and Moore, 1978); consequently only that portion of the model that is pertinent to our current discussion will be presented here. (The full path diagrams are presented for the interested reader in Appendix Figures 1-4.)

The top panels of Tables 21 and 22 present the two stage least squares (2SLS) and the ordinary least squares (OLS) estimates for women whose first child was born when they were 18 or younger. In the 2SLS estimates, both education and age at first birth are dependent variables simultaneously, while in the OLS estimates, only one variable is a dependent variable at a time.

Specification of simultaneous causality supports the hypothesis that an early birth has a causal impact on schooling among these sub-samples of early childbearers. In fact, in the simultaneous model, the impact of a birth is

TABLE 21: Standardized OLS and 2SLS Estimates of the Relationship Between Educational Attainment and Age At First Birth (National Longitudinal Survey)

Age at First Birth ≤ 18

	Education Dependent		Age at First Birth Dependent	
	2SLS	OLS	2SLS	OLS
Age in 1968	.193*	.173*	a	b
Parental Socioeconomic Status	a	b	a	b
Intact Family of Origin	a	b	-.180*	-.236*
Age at First Marriage	a	b	.171*	.214*
Urban Background	a	b	a	b
Farm Background	a	b	a	b
Home School Environment	.422***	.432***	a	b
Number of Siblings	-.188*	-.236**	a	b
Educational Attainment	c	c	.170ns	.416***
Age at First Birth	.656*	.375***	c	c
R^2	.42	.46	.18	.28
N	106	106	106	106

18 < Age at First Birth ≤ 27

	2SLS	OLS	2SLS	OLS
Age in 1968	a	b	a	b
Parental Socioeconomic Status	.161*	.171**	a	b
Intact Family of Origin	a	b	a	b
Age at First Marriage	a	b	.348***	.360***
Urban Background	a	b	.134*	.145*
Farm Background	.193**	.190***	a	b
Home School Environment	.505***	.476***	a	b
Number of Siblings	a	b	a	b
Educational Attainment	c	c	.386***	.385***
Age at First Birth	.250*	.277***	c	c
R^2	.51	.52	.33	.35
N	223	223	223	223

a variable included in model but not this equation
b variable excluded from this equation
c variable is dependant variable in this equation
* $p < .05$
** $p < .01$
*** $p < .001$

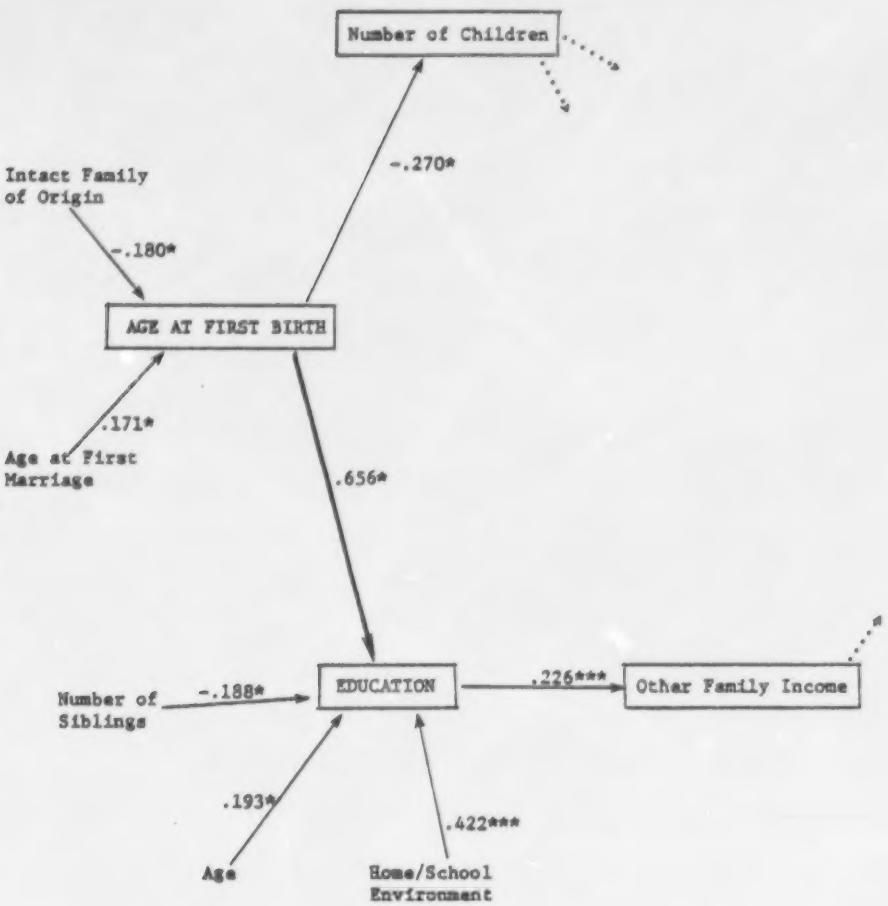
Table 22: Standardized OLS and 2SLS Estimates of the Relationship Between Education and Age at First Birth (Panel Study of Income Dynamics)

	Age at First Birth ≤18			
	Education Dependent		Age at First Birth Dependent	
	2 SLS	OLS	2 SLS	OLS
Age in 1976	-.119*	-.051*	.119*	.265***
Parental SES	.224***	.370***	.093	.076**
White	-.166**	-.012	.068	-.091***
Farm Background	.013	.062**	-.011	-.002
Southern Background	a	b	-.233***	-.005
Number of Siblings	-.247***	-.168***	a	b
Oldest	-.030	-.064**	a	b
Catholic	a	b	.083	.012
Age at First Marriage	a	b	a	b
Education	c	c	-.047	.375***
Age at First Birth	.178**	.348***	c	c
R^2		.195		.158
N		347.		347.
	Age at First Birth >18			
Age in 1976	-.079	-.043	.122***	-.099***
Parental SES	.386***	.381***	-.093	.034
White	.009	.052	.039	.056*
Farm Background	.020	.053*	b	b
Foreign	-.053*	-.069**	b	b
Southern	-.022	-.007	.034	.044
Number of Siblings	-.175***	-.188***	.070	.042
Oldest	a	b	.027	.055
Catholic	a	b	-.030	-.040
Age at First Marriage	-.074	.168***	.550***	.643***
Education	c	c	.200	.085***
Age at First Birth	.304	.111***	c	c
R^2		.309		.471
N		1,352.		1,352.

a = variable included in model but not this equation
b = variable excluded from this equation
c = variable is dependent variable in this equation

* = $p < .05$
** = $p < .01$
*** = $p < .001$

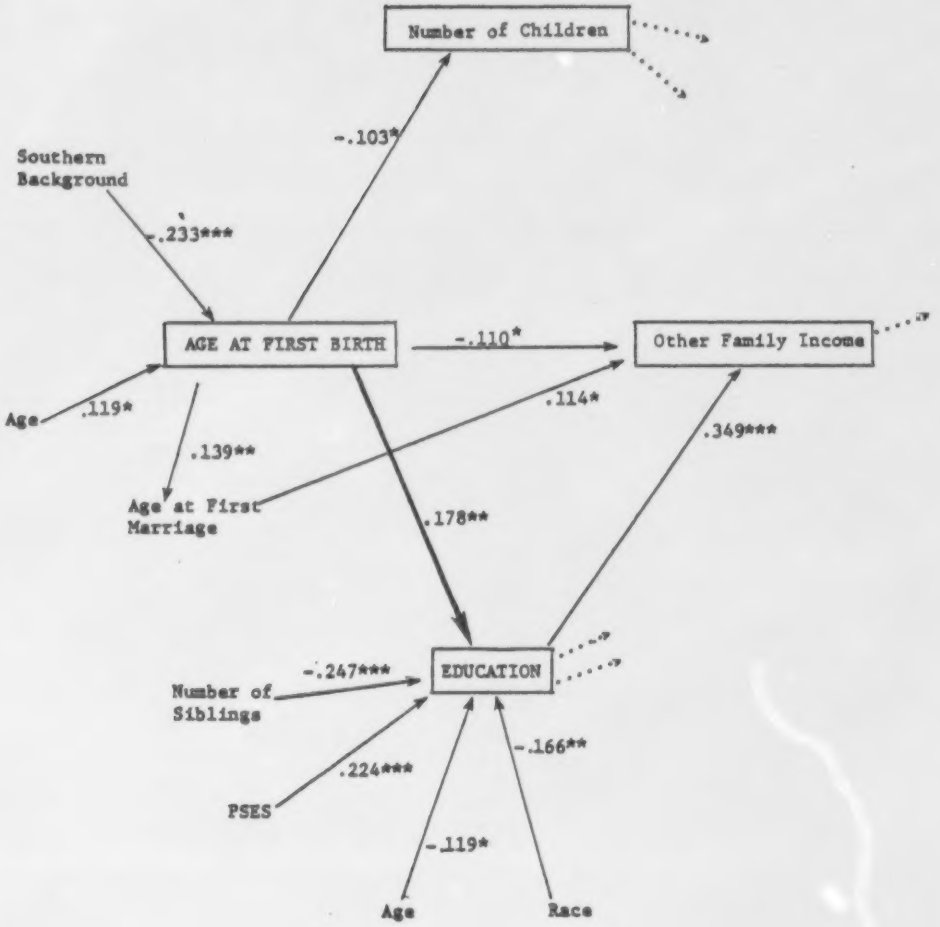
Figure 3: Causal Model of the Association Between Age at First Birth and Schooling Among Women Age 27, Who Bore their First Child Before Age 19 (National Longitudinal Survey)[a/]



[a/] Standardized Coefficients
N = 106
The full causal model is presented in Appendix Figure 1. The causal model for NLS women whose first child was born at age 19 or later is presented in Appendix Figure 2.

* = p < .05
** = p < .01
*** = p < .001

Figure 4: Causal Model of the Association Between Age at First Birth and Schooling Among Women in 1976, Who Bore Their First Child Before Age 19 (Panel Study of Income Dynamics)[a/]



[a/] Standardized Coefficients
N = 347
The full causal model is presented in Appendix Figure 3. The causal model for PSID women whose first child was born at age 19 or later is presented in Appendix Figure 4.

* = p < .05
** = p < .01
*** = p < .001

strengthened in the NLS equation, though it is weakened slightly in the PSID equation. On the other hand, there is no evidence that schooling affects age at first childbirth in the simultaneous model. In other words, the causal direction is from childbearing to schooling. The effect of the age at which a woman has her first birth seems to be very strong if she has that first birth while she is yet of high school age, but there is no evidence of reciprocal causation.

When women who were at least 19 at the time their first child was born are considered, however (see the bottom panels of Tables 21 and 22), the picture is quite different. Among NLS mothers who were at least 19 when their first child was born, there is evidence of simultaneous causality. The impact of a birth on education is much smaller than it is among the school-age mothers (.250 versus .656 for the younger mothers), while the impact of schooling on age at first birth becomes significant and large. Indeed, among mothers at least 19 at their first birth, the impact of schooling on age at first birth is larger than the impact of a birth on schooling. Among PSID mothers who were at least 19 at first childbirth, neither effect is statistically significant; factors other than education determine the timing of the first birth among these older women and factors other than fertility determine educational attainment. Thus, the crucial causal impact of a birth on educational attainment seems to be concentrated among teenage mothers. This makes some intuitive sense. Among women who become mothers at older ages, more varied and personal factors are likely to affect schooling and the timing of childbearing. Among women who first become mothers during the high school years, however, the fact of that birth seems to intrude and supersede other factors that would normally determine educational attainment.

SUMMARY AND CONCLUSIONS

Given the importance of education to later economic and social status, it is surprising that the impact of an early birth on young women's educational attainment has not received much attention from researchers in the past. A strong negative association between age at first childbirth and years of schooling completed has been documented; but these associations have not been tested within statistical models that control for important social, economic, and motivational factors. Therefore it is not clear whether the attainment of young women is inhibited by having a first birth at a young age or whether the achievements of early childbearers are limited by personal and social characteristics other than their age at first birth.

The Impact of an Early First Birth

Results from our analyses clearly indicate that early childbearing is associated with significant educational losses. Among the young women age 24 in the National Longitudinal Survey (NLS) sample, girls who bore a child at 15 or younger completed only 9 years of school on the average. Those who had a first birth at 16 or 17 completed ten and one-half years, on the average.

When the effects of factors such as family background, educational goals, and age at marriage are controlled for statistically, young women who had a first birth at age 15 or younger were found to complete nearly two years less schooling than the young women who were still childless at age 24. The impact of teenage childbearing occurs net of these other factors. In every analysis, age at first birth was the strongest or one of the strongest influences on schooling.

Age at First Marriage

Early marriage also has a significant negative impact on the years of schooling a young woman is able to complete. It is difficult to sort out the effects of an early birth from early marriage, since they so frequently occur together. However, it is clear that the young woman who both has a child and who marries is the most likely to drop out of school. The young woman who bears a child but does not marry is only half as likely to drop out as the young woman who becomes both a mother and wife. Whether she marries or not, though, the school-age mother is considerably more likely to discontinue her formal education than a teenager who has not borne a child.

Catching Up on Schooling Over Time

We looked at educational attainment among young women in the NLS sample at age 18 and 21, as well as at age 24. Our goal was to examine the possibility that there is an initial loss which is overcome by the young women as the years go by. On the contrary, the young mothers did not seem to catch up with their later-bearing peers. In fact, the gap between the young mothers and the young women who are childless at 18, 21, and 24 increases as the childless women continue their schooling.

Subsequent analyses on Panel Study of Income Dynamics (PSID) data suggest that some increases in education do occur even though the young mothers do not catch up. For example, among the PSID women aged 22 to 34, those who became mothers at age 15 or less completed 10.4 years of schooling, compared to 8.9 years among the NLS women. Among PSID women who became mothers at 16 or 17, the mean is 11.0, compared to 10.5 among the NLS mothers. While these are not particulary impressive gains, they do show that some women manage either to return to school, attend adult education, or perhaps pass a high school equivalency examination. At age 24, fewer than 10 percent of the youngest NLS

mothers are high school graduates. However, among PSID women aged 22 to 35, 40 percent of the blacks and 24 percent of the whites had managed to secure a high school diploma. This is an important gain, since evidence suggests that women who achieve at least a high school education are only half as likely to live in households receiving Aid to Families with Dependent Children (Moore, 1978). Nevertheless, in no instance do even half of the women who became mothers at 17 or younger manage to acquire 12 years of education. For most of the young mothers, then, an early birth appears to pose more than a temporary setback to schooling.

The Process of Educational Attainment

Another analysis suggests that the factors that are important to the process of educational attainment differ between young women who bear a child during the high school years and those who delay. Among those who postpone childbearing, motivation of the individual and encouragement or help from others are the most important factors related to years of schooling completed at age 24. However, for teenage mothers, the characteristics of her family are most important. A girl with an advantaged family background--fewer siblings, higher father's education, and an intact family--probably has an easier time coping with the responsibilities of a new baby while also finding it possible to attend school. The impact of the parent's educational goal for her and being in a college prep curriculum are far less important to the teenage childbearer than to the childless teenager, presumably because the realities of motherhood make if difficult for her to realize previous goals, whatever they are.

Race

In the NLS analyses, after controlling for age at first birth, family background and motivational factors, the young woman's race has only a tiny

and non-significant effect on schooling. Yet we know that teenage childbearing has an impact on educational attainment and that early childbearing is considerably more common among blacks in the United States. Further analyses were therefore conducted for blacks and whites separately, with interesting results.

We had hypothesized that black females would suffer less of an educational disadvantage from adolescent childbearing than their white peers. Since teenage parenthood is much more common among blacks than among whites, social mechanisms for dealing with this occurrence seem likely to be better established in black families and neighborhoods or in school systems with a high proportion of black students. Other evidence suggests that the presence of babies and young children interrupts the lives of black women less than those of white women. In line with this reasoning, we do find that early childbearing has far less effect on educational attainment among blacks than among whites. In fact, when variables measuring the woman's age at first marriage plus measures of background and motivation are included in the regression equation, the coefficients for age at first birth remain strong and statistically significant among whites but fall to non-significance among black women. Among young black women in the NLS regression, only those births occurring at the youngest ages are associated with educational decrements, a trend that is replicated in the PSID regression. The negative impact of an early marriage noted among PSID women is not replicated, however. This may be due to a weakening of the negative impact of marriage over time, since the impact of an early marriage is also weaker among young NLS white women than it is among older PSID white women. This seems reasonable, since combining school attendance with marriage seems to have become easier over the years, while little has changed over time to make the emotional and

economic demands of motherhood more compatible with school enrollment.

In sum, early childbearing appears to have a strong negative impact on the educational attainment of whites, and a moderate (if not statistically significant) negative impact on the schooling of black women. Early marriage has a negative impact on the schooling of both whites and blacks, although the negative impact of marriage seems to have lessened somewhat in recent years.

Causality

When asked why they had dropped out of high school, over half of the NLS respondents gave marriage or pregnancy as their reason. Since we know that many school-age marriages involve a pregnancy, the effects of both factors were explored in an analysis of the probability of school drop-out.

These transition probability results indicate that marital status at the time of the first birth conditions the impact of that birth on schooling. For example, of the young women in tenth grade or lower, of those who both marry and have a baby during the year at risk, 77 percent leave school. Among those who marry but do not have a live birth that year, 78 percent nevertheless drop out. Of course, many of these brides are pregant, which makes it difficult to disentangle the effects of marriage from the effects of pregnancy. Women who are already married and who do not have a child during the year experience intermediate probabilities of school leaving. That is, they drop out more often than single women but less often than women who both marry and become mothers. Women who become mothers but do not marry are nearly three times as likely to drop out as non-mothers, but they are less likely to quit school than women who marry. Thus, there is a rough ordering among high school age women in the likelihood of leaving school. Those who are neither wives nor mothers are most likely to remain in school; only 7-9

percent drop out. Those who become mothers but do not marry are nearly three times as likely to drop out. Those who marry but do not bear a child (though some proportion are undoubtedly pregnant) and those who both marry and bear a child have the highest probabilities of dropping out; nearly 4 in 5 of these young women quit school.

Another approach to the question of causality involves development of causal or path models, in which the variables "age at first childbirth" and "years of schooling" are allowed to affect one another. These analyses indicate that among women who have a child when they are age 18 or younger, the causal direction is <u>from</u> childbearing <u>to</u> schooling. This pattern was found in analyses of both the young NLS women and the older PSID women. It substantiates the expectation that the age at which a woman bears her first child has a very strong impact on educational attainment if she has that first birth while still in high school. The number of years of high school that a girl has finished has no reciprocal effect on the age at which she bears that first child. Among older mothers, however, causality was found to flow in both directions in the NLS sample, though the effect of education on childbearing was somewhat stronger than the impact of childbearing on schooling. Among PSID older mothers, no statistically significant associations were found. Thus, the primary effect of a birth on educational attainment occurs among those women who bear their first child during the high school years.

In sum, our results indicate that an early birth affects the amount of schooling a young woman is able to complete, even when family background and motivation are controlled and particularly among whites. Early marriage also seems to have a strong negative effect on schooling, though the effect may have lessened over time. Our analysis also supports the view that an early birth plays a causal role in school drop-out; while not all or even

most drop-outs are due to pregnancy, among those girls who become pregnant, the pregnancy seems to greatly increase the chances that a girl will drop out over what her chances would have been if she had not become pregnant. Finally, we find little evidence that teenage mothers are later able to catch up with their peers who delay childbearing. Rather, an early first birth seems to result in a life-long loss of schooling.

Appendix Table 1: Definitions, Means and Standard Deviations of Variables by Age 18,21, and 24 (National Longitudinal Survey)

Name	Definition	Age 18		Age 21		Age 24	
		Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Educational Attainment	Number of years of schooling completed at 18, 21, 24, in years	11.325	1.252	12.354	1.900	12.460	2.405
AFBLT16	Age at first birth less than 16 (yes = 1, no = 0)	.029	.167	.017	.130	.028	.155
AFB16-17	Age at first birth 16 to 17 (yes = 1, no = 0)	.097	.296	.079	.270	.088	.284
AFB18	Age at first birth 18 (yes= 1, no = 0)	—	—	.083	.277	.095	.293
AFB19-20	Age at first birth 19 to 20 (yes = 1, no = 0)	—	—	.165	.371	.186	.389
AFB21-23	Age at first birth 21 to 23 (yes = 1, no = 0)	—	—	—	—	.205	.404
AFB$\geq$18,21,24	No children by 18, 21, or 24 (yes = 1, no = 0)	.875	.331	.656	.475	.402	.490
Number of Siblings	Respondents number of siblings	3.306	2.350	3.030	2.325	2.953	2.313
Occupation of Head	The occupational status of the head of respondent's household, measured by the Duncan SES scale	36.364	24.508	34.971	24.027	35.188	24.273
Mother's Education	Mother's educational attainment in years	11.035	2.843	10.831	2.900	10.542	3.094
Father's Education	Father's educational attainment in years	10.990	3.563	10.848	3.582	10.185	3.675
Intact Family	Structure of family of origin (intact = 1, not intact = 0)	.858	.350	.861	.348	.861	.347
Home Culture Index	Index of home culture ranging from 0 (low) to 3 (high)	2.394	.857	2.377	.870	2.264	.941
Parent's Educational Goal	Expectations of respondent's parents when she was 14 for her ultimate educational attainment	.571	.495	.563	.498	.506	.500
Parent-Teacher Help	Index of the amount of encouragement to go to college the respondent got from parents and teachers ranging from 1 (none) to 9 (lots)	5.809	2.546	5.426	2.650	5.083	2.679
High School Curriculum	High school curriculum (college prep. = 1, other = 0)	.362	.481	.389	.488	.368	.483
Age in 1968	In years	16.008	1.386	19.036	1.395	22.00	1.454
Race	Respondent's race (white = 1, black = 0)	.875	.331	.880	.325	.890	.314
South	Region of residence when the respondent was 14 (South = 1, non-South = 0)	.308	.462	.305	.461	.324	.468

Appendix Table 2: Variables, Definitions, Means and Standard Deviations for Education Analyses (Panel Study of Income Dynamics)

Independent Variables	Definition	Mean	Standard Deviation	Whites Mean	Whites Standard Deviation	Blacks Mean	Blacks Standard Deviation
Education	Years of Schooling Completed by Respondent in 1976	12.290	2.307	12.482	2.366	11.404	1.760
Age at First Birth	Respondent's Age at the Birth of Her First Child: Dummy Variables (1 = Yes)						
≤ 15		.014	.115	.014	.103	.027	.162
16-17		.098	.278	.097	.296	.102	.303
18		.062	.241	.061	.239	.066	.248
19-20		.194	.395	.205	.403	.143	.350
21-23		.214	.410	.242	.429	.083	.276
≥ 24		.419	.494	.385	.487	.580	.494
Age at First Marriage	Respondent's Age at First Marriage: Dummy Variables (1 = Yes)						
≤ 15		.034	.182	.035	.184	.030	.172
16-17		.182	.386	.195	.396	.123	.329
18		.137	.343	.151	.358	.066	.249
19-20		.250	.433	.271	.445	.144	.351
21-23		.254	.435	.239	.427	.329	.470
≥ 24		.143	.350	.109	.312	.308	.462
Age in 1976	Respondent's Age in 1976 in Years	37.209	8.115	36.659	7.916	30.773	8.536
Farm Background	Respondent was Asked, "Where Did You Grow Up?"	.198	.398	.208	.406	.150	.358
Father's Education < 10 Years	Respondent was Asked, "How Much Education Did Your Father Have?	.456	a	.469	a	.392	a
= 10-12 Years		.412	.492	.378	.485	.573	.495
> 12 Years		.132	.339	.153	.360	.035	.184
Father's Occupation	Status of Respondent's Father's Job, Measured by the Duncan SEI Scale (Duncan et al., 1972)	36.824	21.877	36.321	20.551	40.052	28.811
Foreign Background	Respondent Grew Up in a Foreign Country (1 = Yes)	.032	.177	.038	.192	.004	.060
Mother's Education < 10 Years	Respondent was Asked, "How Much Education Did Your Mother Have?	.389	a	.408	a	.318	a
= 10-12 Years		.503	.501	.466	.499	.675	.469
> 12 Years		.108	.311	.126	.332	.027	.161
Number of Siblings	Number of Respondent's Siblings	3.724	2.326	3.400	2.213	5.099	2.293
Southern Background	Whether Respondent Grew Up in the South (1 = South, 0 = Other)	.299	.458	.230	.421	.622	.486
Race	Race of Respondent (1 = White, 0 = Black) [The small number of non-white/non-blacks are excluded from the analysis.]	.823	.381				

a = omitted category

Appendix Table 3: School Drop Out Probability, Some High School, 1968-72 (National Longitudinal Survey)

Eligible: Women enrolled full time and with grades completed less than or equal to ten at t
Dependent Variable: = 1 if not enrolled full time at t+1; mean = .099

Independent Variables	Mean of Independent Variable	B	Beta
I. FIRST BIRTH			
Prior Firsr Birth	2.6%	.058	.031
Prior First Birth One Year Ago	.9%	.099	.031
II. OTHER CHARACTERISTICS			
White	88%	-.030	-.032
Year 1968	49%	-.087***	-.145***
1969	35	-.027	-.042
1970	14	a	a
1971	.2	a	a
Parent Teacher Help	6.19	-.0067***	.054***
Education-mother	11.0 years	-.0034	-.032
Education-father	11.2 years	.0022	.025
Home culture Index	2.4	-.0090	-.025
Never Married	99%	-.048	-.017
Worked Zero Weeks	54%	-.019*	-.032*
III. CURRENT MAJOR LIFE CHANGES			
First Birth; Timing			
Premarital	1.44%	.010	.004
Uncertain	.83%	-.16	-.048
Postmarital	.10%	.17	.018
Birth, First or Later	2.83%	.13	.017
Marriage	3.37%	.71***	.43***
Constant Term		.276	

R^2 = .252 F = 42.9 N = 3462

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

Appendix Table 4: School Drop Out Probability, High School Graduates 1968-72 (National Longitudinal Survey)

Eligible: Women enrolled full time with eleven grades completed at t
Dependent Variable = 1 if not enrolled full time at t+1 mean = .476

Independent Variables	Mean of Independent Variable	B	Beta
I. FIRST BIRTH			
Prior First Birth	4.1%	-.18*	-.07*
Prior First Birth One Year Ago	1.3%	.18	.04
II. OTHER CHARACTERISTICS			
Birth Cohorts 1952-1954	76%	.12**	.10**
1948-1951	23%	a	a
1940-1947	1%	a	a
Year 1968	14.5%	.047	.037
1969	28%	.056*	.051*
1970	31.6%	-.12***	-.11***
1971	20.9%	a	a
Parent Teacher Help	6.41	-.056***	-.27***
Education-father	11.21 years	-.029***	-.19***
Home Culture Index	2.45	-.0047	-.0067
College Curriculum	33%	-.21***	-.20***
Never Married	97%	.15*	.055*
Worked Zero Weeks	35%	.22***	.21***
Wage Rate	64%	.058***	.097***
Demand for Female Labor	31	-.0053*	-.045*
III. CURRENT MAJOR LIFE CHANGES			
First Birth Timing			
Premarital	.5%	.19	.028
Uncertain	1.3%	.24	.055
Postmarital	.5%	.11	.015
Birth, First or Later	3.1%	-.16	-.05
Marriage	8.7%	.31***	.18***
Constant Term		.751	

R^2 = .334 F = 34.8 N = 1903

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

Appendix Table 5: School Drop Out Probability, Some College
1968-72 (National Longitudinal Survey)

Eligible: Women enrolled full time and with 12-14 years completed at t
Dependent Variables: = 1 if not enrolled full time at t+1; mean = .201

Independent Variables	Mean of Independent Variable	B	Beta
I. FIRST BIRTH			
Prior First Birth	4.6%	-.056	-.029
Prior First Birth One Year Ago	.9%	-.049	-.011
II. OTHER CHARACTERISTICS			
Birth Cohorts 1952-54	32%	.013	.015
1948-1951	61%	.054	.066
1944-1947	6.5%	a	a
Year 1968	21%	.058	.058
1969	22%	.071*	.074*
1970	23%	.023	.024
1971	34%	a	a
Parent Teacher Help	7.3	-.023***	-.11***
Home Culture Index	2.7	.025	.035
College Curriculum	4%	-.068***	-.080***
Worked 0 Weeks	25%	-.063*	-.068*
Received Public Assistance	2.1%	.095	.036
Wage Rate	$1.09	.021*	.063*
Demand for Female Labor	31.7	.016***	.083***
AFDC Benefit Level	$253.48	.00028*	.043*
Dull	11%	-.089*	-.069*
Divorced	.4%	-.17	-.027
Widowed	.06%	.70*	.043*
III. CURRENT MAJOR LIFE CHANGES			
First Birth Timing			
Premarital	.1%	-.18	-.016
Uncertain	.8%	.24	.053
Postmarital	.8%	.17	.38
Birth, First or Later	2.4%	.19	.073
Marriage	16%	.10*	.094*
Remain Unmarried	77%	-.050	-.052
Constant Term		.13	

R^2 = .071 F = 6.68 N = 2208

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

Appendix Table 6: School Drop Out Probability, College Graduate, 1968-72 (National Longitudinal Survey)

Eligible: Women enrolled full time and with 15 years completed at t
Dependent Variable = 1 if not enrolled full time at t+1; mean = .701

Independent Variables	Mean of Independent Variable	B	Beta
I. FIRST BIRTH			
Prior First Birth One Year Ago	2.4%	-.47*	-.15*
II. OTHER CHARACTERISTICS			
White	94%	.16	.083
Year 1968	22%	-.10	-.092
1969	24%	.0088	.0082
1970	24%	-.11	-.10
1971	30%	a	a
College Curriculum	85%	.17	.093
Wage Rate	$1.20	-.068***	-.20***
Unemployment Rate	4.82%	-.0086	-.038
Dull	16%	-.21**	-.17**
III. CURRENT MAJOR LIFE CHANGES			
First Birth, Timing:			
Uncertain	.5%	-.063	-.009
Postmarital	3.1%	-.15	-.055
Birth, First or Later	4.5%	.086	.039
Marriage	22%	.060	.054
Remain Unmarried	59%	-.13	-.14
Constant Term		.77	

N = 387

* = $p < .05$
** = $p < .01$
*** = $p < .001$

a = omitted category

Appendix Table 7: School Drop Out Probability, Post College, 1968-72 (National Longitudinal Survey)

Eligible: Women enrolled full time with 16 or more years completed at t
Dependent Variable: = 1 if not enrolled full time at t+1 Mean = .238

Independent Variables	Mean of Independent Variable	B	Beta
I. FIRST BIRTH			
Prior First Birth	9%	-.14	-.088
Prior First Birth One Year Ago	2%		
II. OTHER CHARACTERISTICS			
Birth Cohorts 1948-1951	22%	-.021	-.020
1944-1947	78%	a	a
White	97%	.21	.090
Parents Expectations for College	90%	-.26**	-.18**
Home Culture Index	2.9	-.078	-.062
Number of Children under 6	11%	-.042	-.037
Wage Rate	2.6	-.052***	-.023***
Received Public Assistance	.7%	.85*	.16*
Dull	37%	-.079	-.090
III. CURRENT MAJOR LIFE CHANGES			
First Birth	1.1	-.43	-.11
Birth, First or later	2.7	.13	.050
Marriage	10.6	.27**	.19**
Remain Unmarried	50.4	.037	.043
Constant Term		.75	

N = 213

* = p < .05
** = p < .01
*** = p < .001

a = omitted category

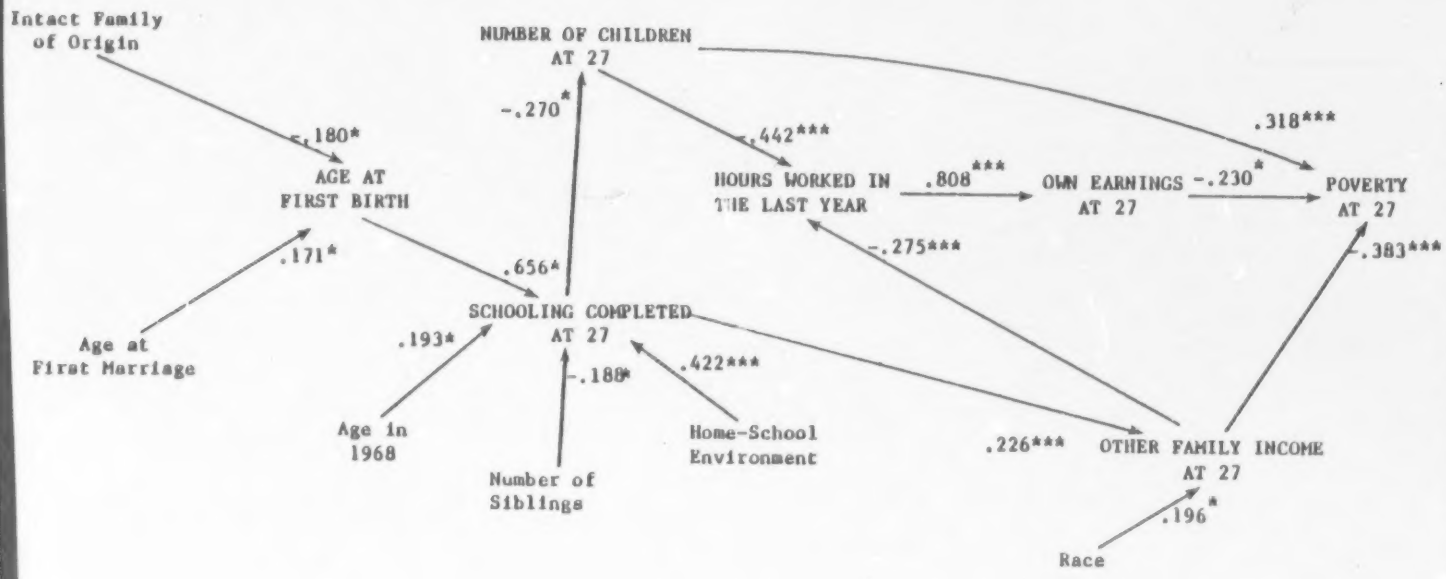
Appendix Table 8: School Leaving Probability: Regression Coefficients for 15-16, 17-18, and 19-20 Year Old Women (Panel Study of Income Dynamics)

	Age 15-16		Age 17-18		Age 19-20	
Independent Variables	b	Sample Mean $\bar{Y}$ = .05	b	Sample Mean $\bar{Y}$ = .27	b	Sample Mean $\bar{Y}$ = .32
First Birth Timing:						
No First Birth Yet	a	.91	a	.84	a	.73
First Birth in Current Year	.11 ***	.04	.15 *	.08	- .10	.05
First Birth in Previous Year	.10 **	.05	.13	.04	.08	.07
First Birth Two Years			- .19	.02	- .02	.05
First Birth Over Two Years Ago			- .25 *	.02	.08	.10
Marital Status:						
Married at Start of Year	- .04	.04	.14	.07	- .10	.28
Not Married at Start of Year	a	.96	a	.93	a	.72
Work Status:						
Worked > 30 Hours in Previous Year	- .05 *	.04	.04	.43	.04	.54
Worked < 30 Hours in Previous Year	a	.96	a	.57	a	.46
Welfare Status:						
Received AFDC in Previous Year	.10	.031	- .14	.029	.00	.019
Did Not Receive AFDC	a	.969	a	.971	a	.981
Decile Income/Needs if Head or Wife	-	.00	- .018	.12	- .01	.84
Decile Income/Needs if Not Head or Wife	- .005	4.01	.016 *	4.22	- .01	3.65
Mother's Education:						
<9 Years	.03	.16	.10	.14	.22 **	.12
9 - 11 Years	.03	.21	.06	.19	.08	.17
≥12 Years	a	.73	a	.67	a	.71
Father's Education:						
<9 Years	.03	.25	.14 **	.27	- .05	.26
9 - 11 Years	.02	.20	.13 **	.16	- .04	.14
≥12 Years	a	.55	a	.57	a	.60
White	.02	.90	- .01	.89	.11	.92
Age:						
15/17/19	- .02	.44	- .03	.52	- .04	.56
16/18/20	a	.56	a	.48	a	.44
Year:						
1968-1969	- .01	.28	.08	.19	a	.33
1970-1971	.01	.44	.19 **	.35	.05	.22
1972-1973	a	.28	.20 **	.28	.07	.23
1974-1975			a	.18	.52 ***	.22
Constant	.03		- .02		.13	
F_2	2.8 ***		3.3 ***		5.7 ***	
R^2	.079		.101		.214	
N	510.		612.		397.	

* = p < .05
** = p < .01
*** = p < .001

a = omitted category
- = omitted from regression

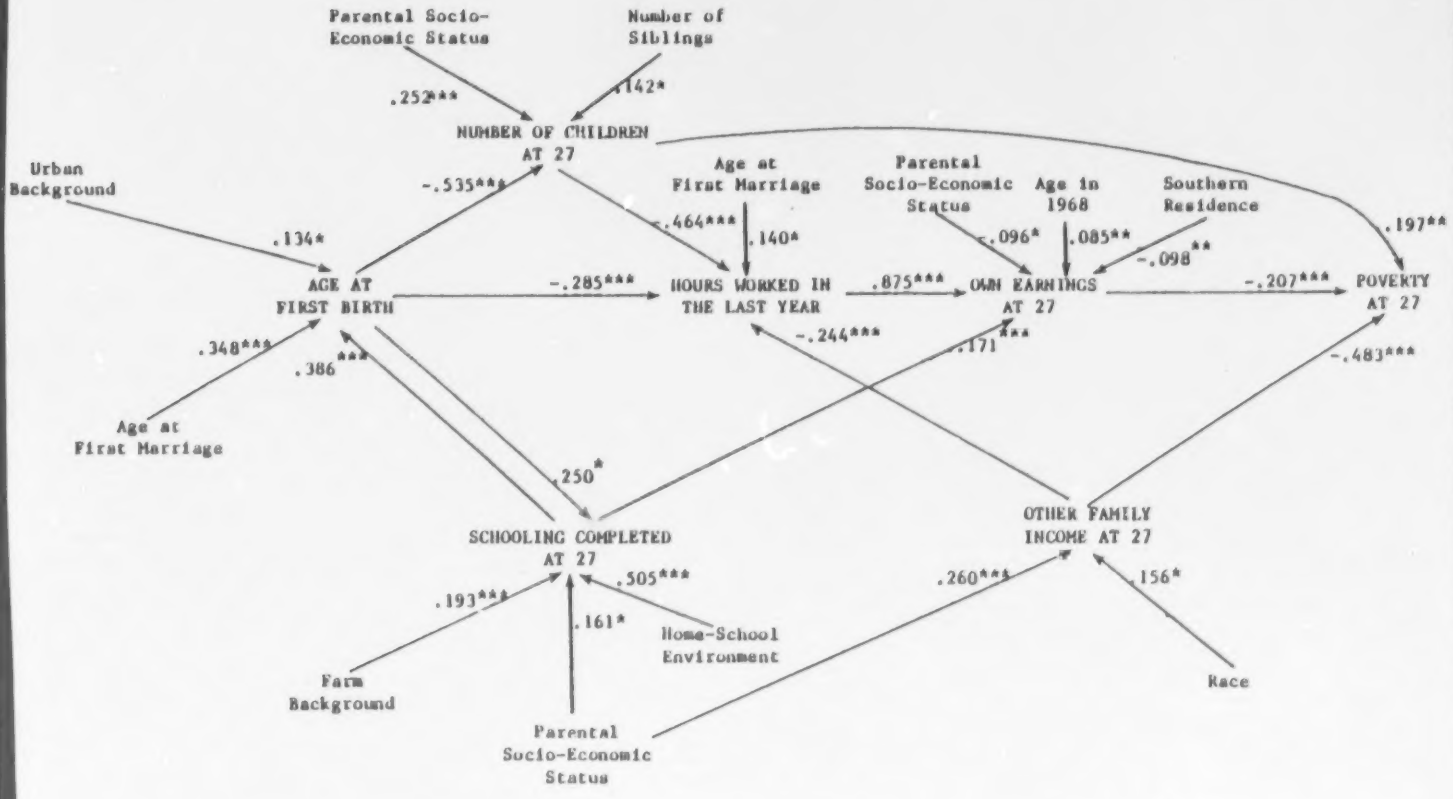
Appendix Figure 1: Path Model, Age at First Birth Less Than or Equal to 18 a/
(National Longitudinal Survey)



N = 106

a/ standardized coefficients
* p < .05
** p < .01
*** p < .001

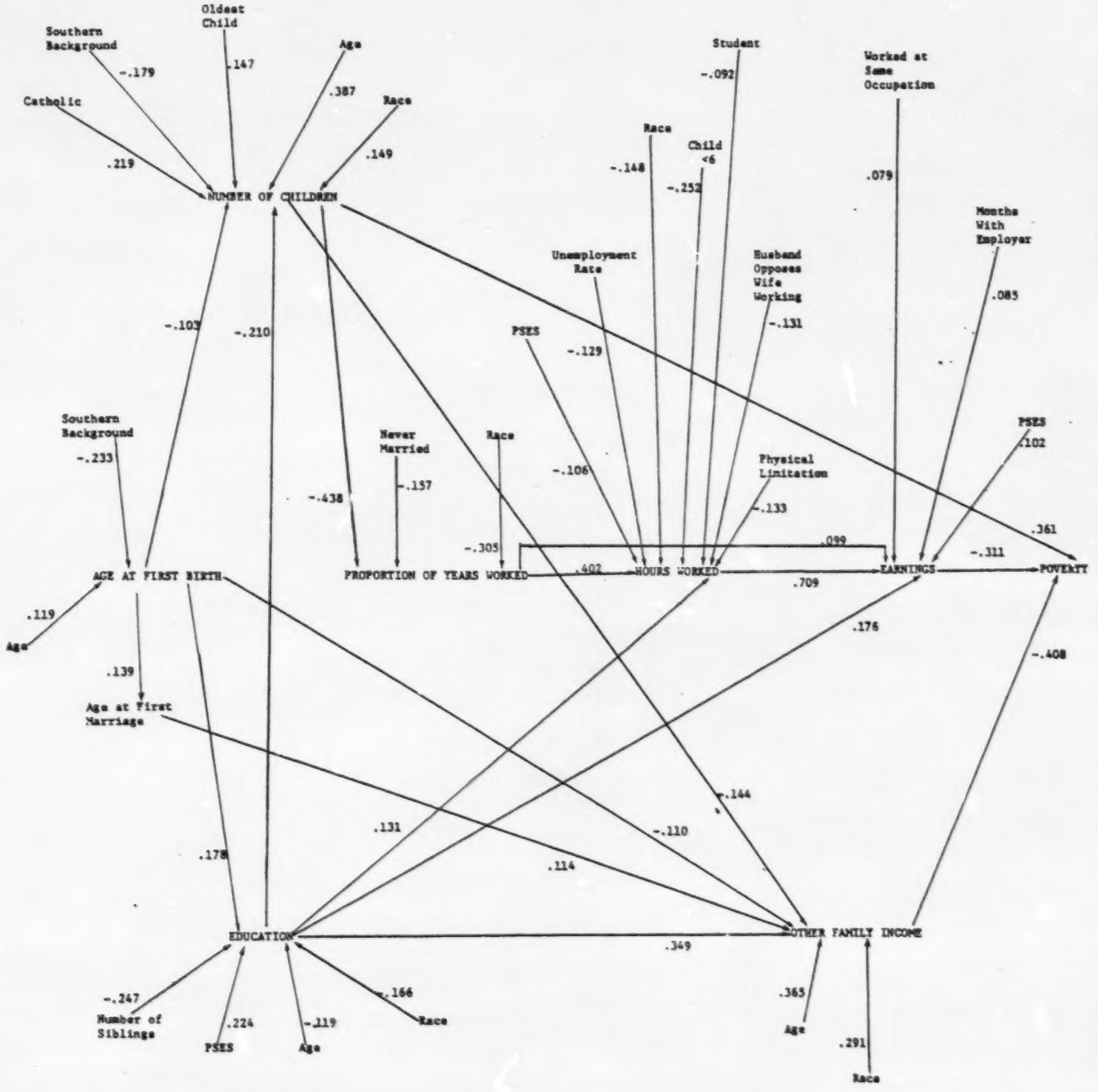
Appendix Figure 2: Path Model, Age at First Birth a/ Greater Than 18 and Less Than 27 (National Longitudinal Survey)



N = 223

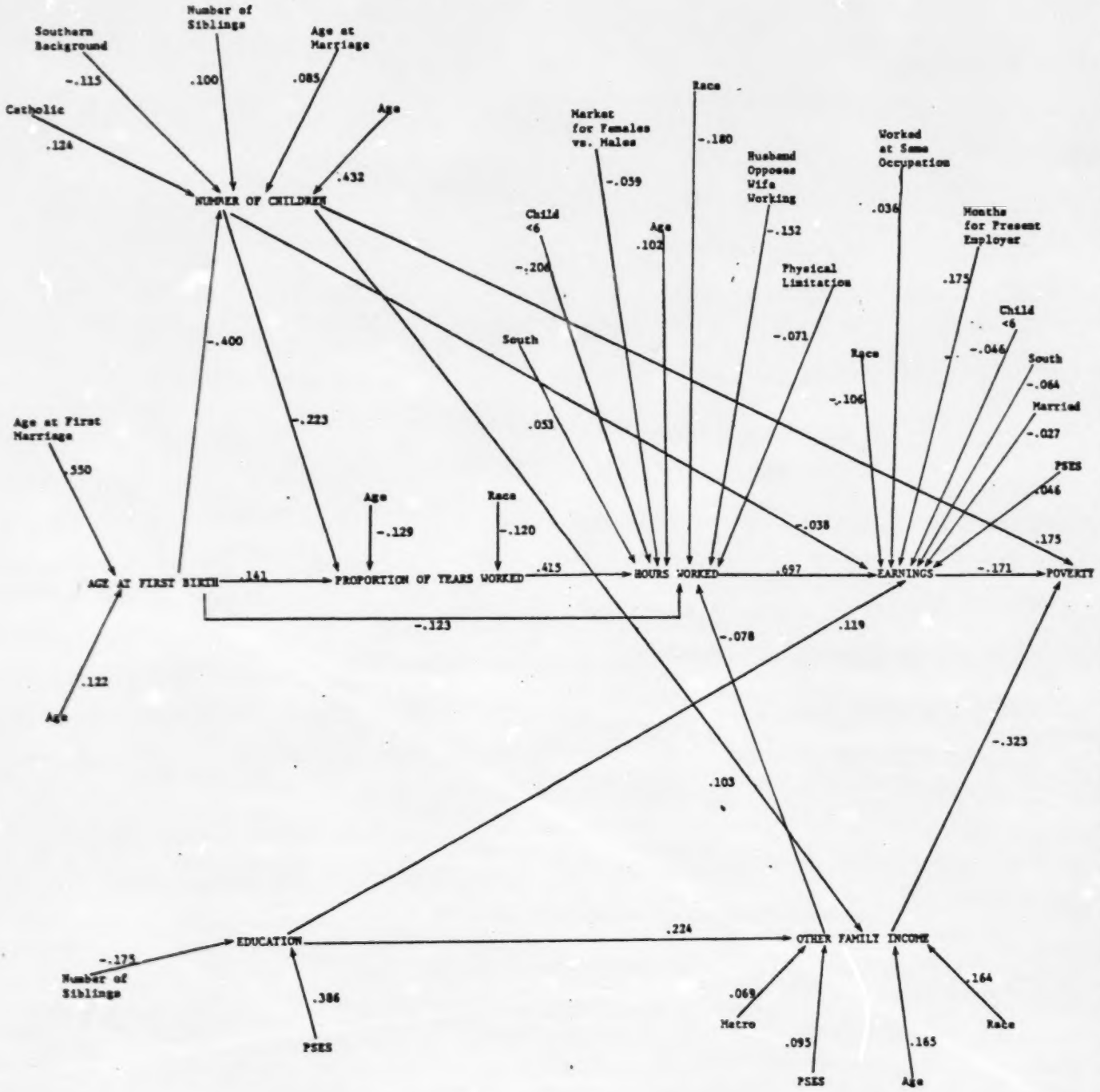
a/ standardized coefficients
* p < .05
** p < .01
*** p < .001

Appendix Figure 3: Path Model, Age at First Birth Less Than or Equal to 18 (Panel Study of Income Dynamics)



a/ Standardized Coefficients; Only those significant at the .05 level or better are presented here.

Appendix Figure 4: Path Model, Age at First Birth Greater than 18[a/] (Panel Study of Income Dynamics)



a/ Standardized Coefficients; Only those significant at the .05 level or better are presented here.

METHODOLOGICAL APPENDIX

Estimating Flow Models: Transition Probabilities

The transition probability approach relies on multivariate models which partition the variance in binary dependent variables. In every case the dependent variable is assigned a one if the woman reports moving to a new status at year t+1, compared to her status at year t. A zero is assigned if the woman remains in the same status at year t+1 as she was in at year t. For example, the schooling exit dependent variable is one if a woman moves out of full-time school enrollment by t+1, given that she was fully enrolled at t. The exit variable is set equal to zero if she remains fully enrolled at t+1. Similarly, if a married woman divorces, the dependent variable is set to one. If she remains with her husband at t+1, the dependent variable is set to zero.

The definition of eligible observations is critical. For example, a woman is eligible for inclusion in the schooling exit sample if she reports being enrolled full-time in school at the start of any year. A woman is eligible for the school re-entry sample if she reports being <u>not</u> enrolled full-time in school at the start of any year. The observational unit is a person-year, which always includes status information both at the start and the end of the year for a particular woman. Given information on status at two points in time, it is possible to define status change variables, such as the dependent variable (e.g., school exit or reentry), but also any number of independent variables.

Both level and change variables are included as predictors. However, for binary status variables (e.g., enrolled full-time in school vs. not enrolled full-time in school) care must be excerised to avoid redundancy. To represent level alone, two dummy variables are defined but only one of them

is included in the equation:

A. Two level measures: (use only one)

(1) Enrolled full-time in school in year t

(2) Not enrolled full-time in school in year t

If change variables are preferred, four dummy variables are defined and three are used:

B. Four change measures: (use only three)

(1) Exit from school between year t and year t+1

(2) Remain in school

(3) Reenter school

(4) Remain out of school

Note, however, that to use three change variables implicitly specifies level, so that both level and change are completely described (e.g., if one either exits from school or remains in school, then one necessarily was in school at t). Including one level together with three change measures is therefore redundant and would cause matrix inversion problems. Care was taken to avoid doing so.

The transition probabilities strategy has taken advantage of the panel data to pool observations. For example, there are five waves of the NLS panel, each woman has four defined person-years: 1968 to 1969, 1969 to 1970, 1970 to 1971, and 1971 to 1972. It is possible for all four of these person-years to be included as observations in a single equation. For example, if a woman is single in 1968, 1969, 1970, and 1971, all four of her person-years would be eligible for inclusion in the first marriage equation.

In ordinary least squares estimation, autocorrelated disturbances do not bias parameter estimates, but they do bias estimates of the standard errors of parameter estimates. Typically the standard errors are biased downwards. One

gets the impression that one's parameter estimates are more efficiently estimated than is truly the case. The heart of the problem is that if a single woman contributes up to four person-year observations, there is something less than four full degrees of freedom in those four observations. Autocorrelation thus typically leads to improper inclusion of variables in an equation based on upwardly biased t-statistics.

Note, however, that parameter estimates with pooling are still unbiased. Moreover, the degree of pooling in these equations is relatively small, since typically fewer than four person-year observations from a single woman are pooled.[1] Where pooling is negligible or absent, our results appear comparable to results with the most pooling. Pooling is most frequent in analyses of the first marriage, marital split, high school drop-out and public assistance entry. In these cases care has been used to be conservative in the use of significance tests.

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1. In the education equations, reentry is estimated with no pooling, and the high school and college graduate exit equations should have virtually no pooling. Where transition rates are high (e.g., over 20 percent), pooling is minimized, as in the re-marriage, first birth (married women), college drop-out, work entry, work exit and public assistance exit equations. The hours and wage equations also minimize pooling.

Dichotomous Dependent Variables

The ideal model form for a binary dependent variable is the logit or a related model. The linear model creates heteroscedartic disturbances and the more basic problem of a misspecified model, especially at the extremes. A maximum-likelihood logit model solves these problems, but it creates other problems:

(1) cost: especially (a) with large data files such as the ones we are using, and (b) with a large number of independent variables and (c) with the likelihood of one or two reestimates of the equation, the very substantial estimation costs must be weighed against the benefits of improved information.

(2) complexity: results of ordinary least squares are easier to understand and communicate by an order of magnitude than maximum likelihood logit estimates. Until the use of maximum likelihood logit grows more familiar, this must be weighted as a cost, especially in policy research.

Goodman has argued convincingly (1976) that ordinary least squares provide virtually identical information as maximum likelihood logit, especially

(1) where n is large and

(2) where the mean of the dependent variable is not too close to the bounds. In all cases, we use an n that is large by Goodman's standards and in most cases the means of our dependent variables are far enough from the bounds by his standards (i.e., between .20 and .80). Caution is warranted for the few equations in which the mean was close to zero (e.g., school re-entry, public assistance entry, and first birth to unmarried women).

S. Caldwell

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